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Organizing and Managing Tropical Disease Control Programs

Case Studies

Bernhard H. Liese, Paramjit S. Sachdeva, and D. Glynn Cochrane

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Preface

Tropical disease remains a serious public health problem in developing countries. Despite a major expansion of primary health care in the 1980s, the burden of tropical diseases, particularly on the rural poor, is increasing. More than 500 million people are infected worldwide, and the prospects of controlling the major diseases — malaria and schistosomiasis — are worsening. Without renewed global and national efforts to control tropical diseases, many people will suffer and die needlessly.

Many tropical disease control programs suffer from financial and institutional weaknesses. A few programs, however, have been notably successful in achieving their program goals over 10 to 15 years or more. The lessons learned in these successful efforts can strengthen tropical disease control programs elsewhere.

This study of tropical disease control programs in Brazil, China, Egypt, the Philippines, and Zimbabwe is based on empirical field data. The seven case studies reported here were written collaboratively by local program managers/researchers and World Bank staff/consultants. Each case study is a self-contained review of a particular program, including its background, strategy, organization, management, results, and lessons of experience.

An inter-country comparison of these case studies has also been undertaken; and is synthesized in a separate report titled *Organizing and Managing Tropical Disease Control Programs: Lessons of Success.* That report provides guidelines on how to improve the organization and management of tropical disease control programs. Its first chapter provides an overview of tropical diseases, the second focuses on the study's scope and sample, and the third chapter outlines the issues examined and the analytical framework. Subsequent chapters review the control technology and organizations, field data and lessons of experience. The target audience is donors, health specialists, and program managers interested in improving tropical disease control programs in developing countries.

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Brazil: Endemic disease control

Introduction

Brazil is a large country — it covers 8.2 million square kilometers, and has a population of approximately 145 million (1986 estimate). The average annual rate of population growth has slowed from 2.5 percent per year in the 1970s to 2 percent per year during the 1980s, and is expected to fall to 1.8 percent by the year 2000. The population is relatively young, with 38 percent under age 15. It is distributed unevenly across an expansive national territory; population density ranges from 0.34 inhabitants per square kilometer in the state of Roraima to 56 per square kilometer in the southeast region.

In the northeastern part of Brazil, 50 million people live in over 4,000 municipalities. If the northeast of Brazil were separated from the rest of the country it would constitute the second largest country in Latin America. It would also be the poorest.

Note: This case study was prepared by D. Glynn Cochrane and Bernhard H. Liese, the World Bank, based on a mission to Brazil in 1988 and revised by Paramjit S. Sachdeva, the World Bank. The data and insights provided by Dr. Agostinho Cruz-Marques and other SUCAM officials; secretarial assistance provided by Carol Knorr and Jeffry Pickett, the World Bank; and funding by the Edna Clark Foundation (grant number 04687) and the World Bank are gratefully acknowledged. The views expressed herein do not necessarily represent the official position of the World Bank, Clark Foundation, or Brazilian Government officials.

Nearly two-thirds of the country lies under the humid tropical rainforests of the Amazon Basin which covers 5 million square kilometers and has an average annual rainfall in excess of 2,000 millimeters. In recent years, this region has attracted many migrant families from all parts of the country, and the Amazonian population has now grown to an estimated 16 million. Brazil's geography is varied, and ranges from the arid hinterlands of the northeast and the savannah of the center-west to the temperate climate of the south and southeast.

Brazil has become a highly urbanized country, with 73 percent of the population living in cities. For several decades, rural-to-urban migration has accelerated rapidly, and during the 1970s Brazil experienced an absolute decline in rural population.

Health status

Health conditions in Brazil are poor despite the country's overall level of economic development. Life expectancy is estimated at 63 years, and infant mortality at 74 per 1,000 live births. By these indicators, Brazil ranks lower than Colombia and Mexico. The impoverished and densely populated states of the northeast reduce the national averages considerably; life expectancy and infant mortality for the northeast are 51 and 123 per 1,000, respectively and 62 and 100 per 1,000, respectively for the Amazon region. Differences in health status between these regions and the more developed southeast reflect equally great differences in income level, sanitation, education, and the quality

and availability of basic health services.

A high proportion of the rural population still suffers from poor sanitation, poor health coverage, and low incomes. Migration from rural areas assists in the transmission of disease. In most parts of the country, diarrhea and respiratory infections are the leading causes of infant death, followed by perinatal causes. Most of the major tropical diseases — particularly malaria, schistosomiasis, Chagas disease, yellow fever, dengue, leishmaniasis, leprosy, and onchocerciasis — are found in Brazil. Malaria is by far the most prevalent (though restricted primarily to Amazonia) and brings with it a considerable economic and social burden.

Endemic diseases

The country has a large public health program for controlling the various tropical diseases. In 1987, 88 million people were protected. This entailed some 55 million house-visits and 30 million kilometers of travel on foot, bicycle, horseback, motorbike, small truck, canoe, and small river boat. Control operations covered 7,700 municipalities. In 1987, over 14 million blood slides were examined, including 1.5 million by volunteers.

MALARIA. Malaria is the most pervasive public health problem of the Amazon region and continues to spread into new areas at an alarming pace. Over 280,000 cases of malaria were reported in 1983, but by the end of 1987 the number had almost doubled to nearly half a million. Data on mortality from the disease are not complete, and under-reporting of deaths is common throughout the region. However, some estimates are available: data for 1977-82 show Rondônia in the lead at 24.6 per 100,000 inhabitants, followed by Roraima (11.9), Acre (8.3), Amapa (8.0), and Para (6.9). The remaining states show rates of 2.2 or below. While this variation may be an artifact of under-reporting, it may also reflect differences in immunity levels within the population. Rondônia, for example, has a large proportion of in-migrants from the southern and southeastern states where the likelihood of prior contact with the parasite is rare.

The outlook for malaria is that it will continue to be an important endemic disease, particularly in Amazonia where a halt in transmission is unlikely until the population stabilizes.

SCHISTOSOMIASIS. Over the years, schistosomiasis-related deaths have been greatly reduced. While there are no prospects for completely halting transmission of the disease, it is possible to eliminate isolated foci. The national control program has an important role to play in the search for active cases through laboratory examination and in the administration of oxamniquine therapy.

YELLOW FEVER. Yellow fever is currently enzootic and the vaccination program undertaken by the Superintendency for Public Health Campaigns (SUCAM) has greatly reduced the population at risk. However, due to wide dispersion of *Aedes aegypti* enzootic contact and subsequent urban transmission remain possible. The ease and speed with which individuals can move from remote rural areas to urban areas compounds the potential difficulties.

DENGUE. *Aedes aegypti* has also been responsible for urban outbreaks of dengue fever. Although the risk of a dengue outbreak cannot be completely eliminated, the risk of a large-scale outbreak has been reduced by the success achieved in decreasing mosquito density and dispersion.

PLAGUE. Plague, which is confined to the northeast, is being tackled with assistance from the Oswaldo Cruz Foundation. The objective is to detect the circulation of Yersina in wild rats and fleas and to take control measures before man is involved. Difficulties are caused by the fact that foci may remain dormant for some years. More-satisfactory approaches depend on the development of new technical innovations.

CHAGAS DISEASE. There is evidence that Chagas disease transmission rates are strongly linked to types of housing, mobility patterns, and the process of animal domestication. Domiciliary transmission of Chagas disease has decreased due to the elimination of the main vector *Triatoma infestans* from the interior of infested homes. Domiciliary transmission has been halted by residual spraying in about 25 percent of the area under risk.

Expansion of endemic areas still takes place as a result of development of new areas, a process which creates new vector reservoirs. Ecological factors are important in understanding the origin and spread of diseases. For instance, yellow fever had significant transmission rates in urban areas during the 1930s; schistosomiasis was spread beyond the northeast by migrant *S. Mansoni* carriers; the spread of malaria is linked to the methods of resource exploitation now used in the Amazon

Basin. Environmental and climatic conditions favour transmission, and require regular control measures which must reach the surveillance phase before responsibility can be given to the general health services.

Health sector institutions

FEDERAL. The Brazilian public health sector is dominated by two institutions, the Ministry of Health (MOH) and the National Institute for Social Security and Medical Assistance (INAMPS). [1988-89 data. In 1990, INAMPS was absorbed by MOH]. The MOH is responsible for setting national health policy and for most of Brazil's basic and preventive health programs. It supervises several important sectoral agencies. INAMPS oversees reimbursement of both public and private medical care and provides some individual curative care through a small network of facilities. Despite its smaller staff, INAMPS has had a considerably higher profile than MOH, both in terms of budget and services offered. By the early 1980s, about 90 percent of all Brazilians were, to some extent, covered by INAMPS, which is funded by payroll taxes.

The three major federal institutions supervised by MOH involved in endemic disease control are: (a) the Public Health Services Foundation, which develops housing improvements and sanitation works in designated endemic areas; (b) the Oswaldo Cruz Foundation, which conducts research and provides technical assistance, training, and laboratory support; and (c) SUCAM, a semi-autonomous organization, the most important institutional actor in endemic disease control. (SUCAM is discussed in detail below.)

STATE AND MUNICIPAL. Public health care is also the responsibility of state, regional and municipal levels. Overall, state secretariats of health have thus far been poorly financed, weakly managed and short of qualified staff. Programs have been highly centralized, but recently an attempt to decentralize and integrate health services has been initiated through the creation of regional health directorates. Outside of larger cities such as São Paulo, municipal-level health services have been limited.

HEALTH PRIORITIES. Brazil's health development strategy gives priority to: (a) extension of basic health services, including nutrition activities; (b) reinforcing endemic disease control; (c) cost-containment and reduction of waste and fraud in INAMPS services; and (d) improving interagency coordination and strengthening state and local capacity to administer and deliver health services. The Government's interest in redressing the critical health situation of Brazil's poorest areas (the northeast and Amazonia) is reflected in policies and strategies addressing basic health problems of low-income groups. These policies stress: (a) control of transmissible diseases, especially endemic and vaccine-preventable diseases; (b) maternal and child care, including family planning; and (c) ambulatory and hospital care, with priority for high-risk groups. The 1986-89 National Development Plan has included the control of endemic diseases as a health sector priority, particularly malaria, Chagas disease, schistosomiasis, and leishmaniasis. Improvement of surveillance activities, and expansion and modernization of the Public Health Laboratories network, have also been proposed.

EXPENDITURES. Total public and private health care expenditures in Brazil probably exceed \$U.S. 10 billion[1] annually, or over 5 percent of gross domestic product. In 1982, combined public and private expenditures on health were about \$U.S. 80 per capita. However, as health spending has increased, so has the gap between total expenditures on individual-curative health care (financed primarily under INAMPS), and collective-preventive health care expenditures (financed by the MOH and the state secretariats of health). Resources have become increasingly skewed in this fashion over the last 40 years: in 1949, only 13 percent of health care spending went to curative services; in 1982, the ratio was nearly reversed — with 85 percent spent on curative and 15 percent on preventive health care.

In addition, by the early 1980s, an imbalanced geographic distribution of health spending and consequently the geographic separation of the functions of INAMPS and MOH had emerged more clearly, with INAMPS specializing in the south, southeast, and center-west — and MOH assuming the major burden of work in the Amazon and the northeast. Since 1982, federal policy has underscored the need for a shift in spending patterns and goals toward improved preventive health care, the largest part of which is endemic disease control. Since SUCAM is the principal institution responsible for such control, it played

1. A billion is 1,000 million

a key role in implementing this important aspect of health policy for the 1986-89 period.

The Superintendency for Public Health Campaigns

A semi-autonomous organization

The Superintendency for Public Health Campaigns (SUCAM) was created by Article 20 of Decree no. 66.623 of May 22, 1970 as a result of the fusion of the Departmento Nacional de Endemias Rurais, the Campanha de Erradicacao Malaria, and the Campanha de Erradicacao Variola. The internal organization of SUCAM was first determined by a Ministerial Portaria no. 222 of July 31, 1970, and then by Ministerial Portaria no. 161 of May 7, 1976. (For a brief historical account of the evolution of disease control in Brazil, see Annex 1).

Ministerial Portaria no. 121 establishes the broad health policy guidelines for endemic diseases within which SUCAM must operate. SUCAM is the largest agency of the Brazilian Ministry of Health, and its mandate covers planning and implementation of control programs for all the endemic diseases in Brazil. SUCAM also participates in providing health care in emergency and disaster situations, and helps other health care institutions with the development of their programs.

Prior to Portaria no. 161, administrative and financial autonomy had been granted to the endemic disease campaigns by Decree no. 66.580 of May 15, 1970, which in turn restated authority given by Law no. 900 of September 29, 1969. Decree no. 77.388 gave authority for the creation of a special fund for SUCAM in order to give it increased flexibility. At the same time, Government created a Personnel Department within SUCAM so that the agency could deal directly with personnel questions.

SUCAM's initial mission statements established broad regional responsibilities but did not sufficiently distinguish between sectors or give flexibility to the municipal and regional levels. The subsequent adjustments to SUCAM created new capacity at the central level with the introduction of a cabinet, a coordinator for planning and budgeting, and a public affairs unit. SUCAM was given authority to cater to special districts such as Amazonia. The agency was also able to create additional regional coordinators, increase the number of program districts from 80 to 96, and enter into contracts with other public institutions engaged in fighting tropical diseases.

SUCAM's institutional resources are not extensive: a staff of less than 40,000, fewer than 2 percent of whom are university graduates. The staff are not well paid by public sector standards; and, indeed, earn less than other civil servants in the health sector. Despite this, few public agencies approach SUCAM's reputation for expertise in the field.

Central departments

SUCAM's central organization consists of one planning unit and four departments. The planning, budget, and control/coordination unit in Brasilia is responsible for planning, programming, and budgeting based on proposals prepared by the 26 regional directorates and worked out with the 80 district-level offices (See Figure 1.1).

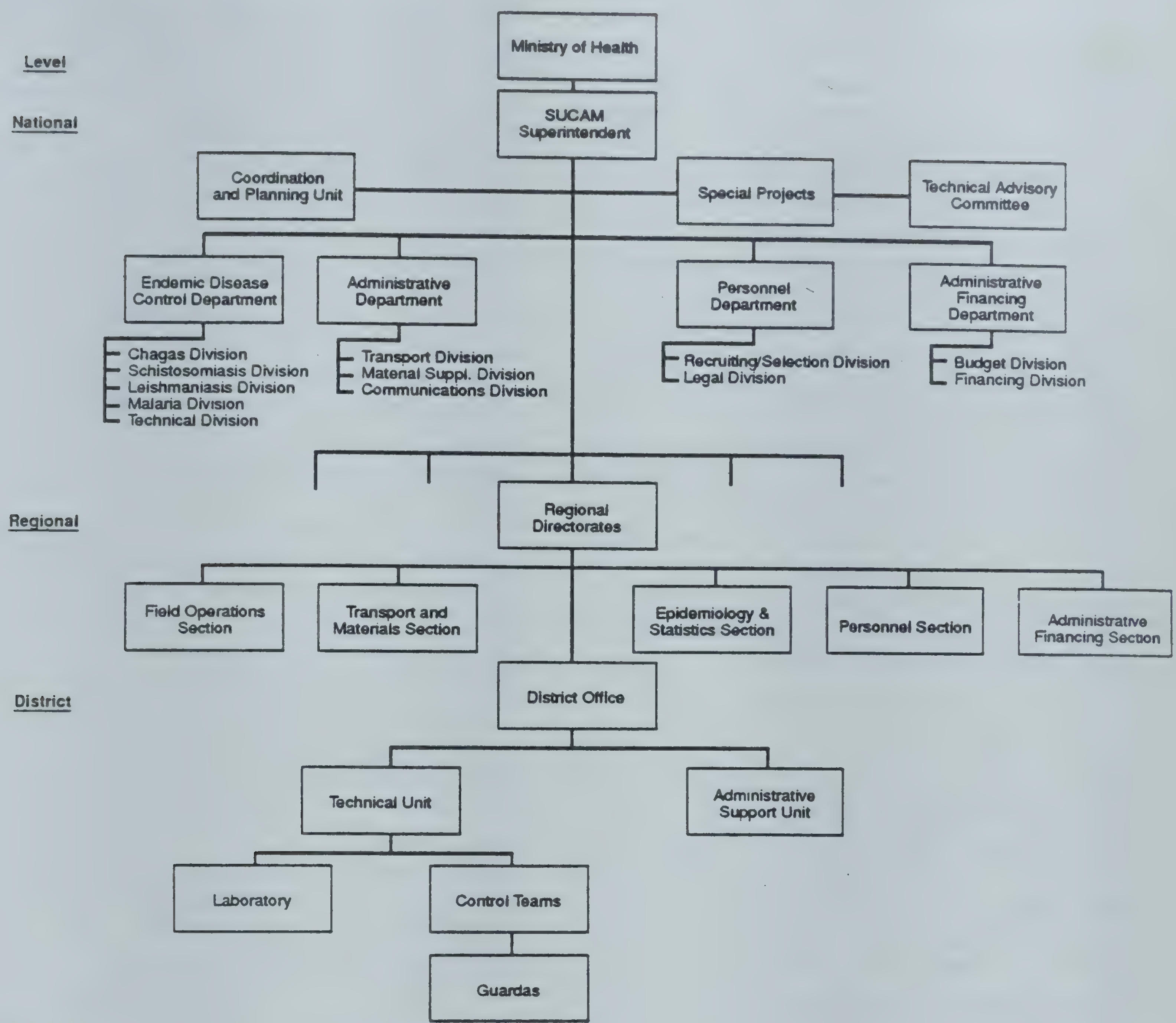
The regional directorates receive technical advice from headquarters. The central administrative department coordinates all aspects of logistical support, including transport, communications, supplies, maintenance, and repairs. Financial administration is under a separate department organized and operated under guidelines established by the Ministry of Finance. The personnel department manages recruitment, selection, training, legal matters, and career development, and is organized as per guidelines of the Ministry of Public Administration.

The central department for eradication and control of endemic diseases has the following technical responsibilities:

- Definition of endemic areas and of residual foci for the application of adequate control measures and for problem identification.
- Direct and indirect protection of the population from endemic diseases by advising on the best way to fight vectors, conduct vaccination, undertake chemotherapy, and prescribe environmental sanitation measures.
- Implementation of an efficient epidemiologic surveillance system for major epidemics.
- Training of staff in the latest technical methods.
- Public awareness programs.
- Sponsoring research and monitoring research developments.
- Coordination with developments in other sectors, especially agriculture, transportation, education, and energy.

Advisory responsibilities for the various campaigns — for malaria, schistosomiasis, Chagas,

Figure 1.1 Partial organization chart of SUCAM



yellow fever, dengue, bubonic plague and leishmaniasis — are specified in a similar manner. Staff in charge of these divisions are required to "coordinate, orient, and supervise their respective campaign activities" throughout the national territory.

The division of epidemiology is responsible for the integrity of epidemiological advice throughout the organization. It is responsible for analysis of data required to support changes in strategy, such as a shift from the attack to maintenance phase of a program. The division also has responsibility for transmission studies throughout the country, has a prominent research role, and is responsible for monitoring and evaluating drug use in campaigns.

The field section of the division of epidemiology is responsible for developing data for training field personnel in mapping; for familiarizing them with the behavior of vectors; and for spraying. In addition, the division is responsible for studying actual operations in the field to assess the possibility of innovation.

The technical division has three broad advisory/support functions — education, technical backstopping, and special projects. The education section is responsible for strengthening and maintaining an emphasis on public health education in the SUCAM work force.

The section in charge of field personnel looks after new entrants to SUCAM, and conducts field training. It is also concerned with community

relations, particularly the issue of how best to work with local populations within the technical parameters of the various campaigns. The cartographic and laboratory sections provide back-up for the field, and provide inputs for the analytical functions that the division of epidemiology and other central units must perform.

The special projects division deals with special cases that do not fit within the central campaign structure. An example is the special advisory requirements associated with the spread of malaria in Amazonia. This division works especially closely with SUCAM's financial authorities because of the probability that some of its work and expenditures are unforeseeable at the beginning of a financial year.

The administrative department is responsible for monitoring the maintenance and safekeeping of capital goods, including buildings and moveable assets for transportation, communications, documentation, and libraries. All permanent assets are classified, logged, and inspected on a regular basis. The division is also responsible for legal matters affecting SUCAM.

Field operations

The support functions at the regional directorate level mirror those at the national level. The operations section promotes the technical norms advanced by the national level of SUCAM, and tries to improve the standards of technical knowledge of field personnel. The epidemiological section, following central advice, analyzes laboratory results and suggests changes in campaigns, if needed. The statistical section maintains, and transmits to the central level, the actual results of campaigns. For this it uses statistical tabulations, maps, and graphs. As at the central level, there are sections dealing with budgeting, finance, and personnel.

Support functions at the district level again mirror those at the regional and national levels. The technical section performs functions associated at higher levels with the department for the eradication and control of endemic diseases. The administrative section performs functions associated with the departments of administration, personnel, and finance at higher levels within SUCAM.

The local level executes field operations, works with communities through house visits, and undertakes laboratory examinations, spraying, and investigations of the vector and intermediary host. The responsibility of epidemiological *guardas* (SUCAM field workers) is to install "notification posts"—i.e. to recruit and train auxiliary workers who can administer medicines and take blood slides for laboratory analysis. The epidemiological *guarda* is also responsible for health education and for making and keeping a map of his area up to date. Other *guardas* are responsible for spraying and for the capture of vectors.

SUCAM's management and execution of field activities is organized hierarchically. From the field level up it can be described as follows: teams of five guards (*guardas*) are led by a chief guard (*chefe de turma*). Five such teams are subordinated to an inspector (*inspetor de endemias*) and five inspectors to a general inspector. The latter, in groups of five, are supervised by a professional in charge of a specific endemic disease control program. The control programs are managed at the local level through local districts (the *sub-distrito*, usually located in a municipal seat). Local districts, ideally, report to sub-regional units called technical-administrative districts (*distritos*) which are officially the primary operational units of SUCAM. These are in turn managed by the regional directorates located in state or territorial capitals. Regional directorates are subordinate to the central-level superintendency in Brasilia.

There are nine regional directorates in Amazonia, coordinating the activities of approximately 8,700 workers in 26 technical-administrative districts. In addition, SUCAM has the support of a volunteer system of notification posts at the community level. The notification-post volunteer (*notificante*), a resident of the local community, collects blood slides from febrile patients (passive case detection) and provides treatment (chemotherapy). SUCAM has about 15,000 such volunteers in the Amazon and over 45,000 in all of Brazil.

Campaigning approach

The "campaign" is the process by which management decisions on the eradication and control of endemic diseases are implemented. SUCAM is a campaigning organization. Campaigning falls into three well defined phases: first, an initial clean-up of the most easily accessible foci; second, the discovery and elimination of the hidden and hard-to-get-at breeding places; and third, continuing vigilance to guard against re-infestation.

An overview of SUCAM's campaigning approach is discussed below. Details of campaigns directed at houses, and the systematic procedures used for mapping, and record-keeping are described in Annexes 2, 3 and 4 respectively. Cam-

paigning is the key to SUCAM's success. In general, SUCAM campaigns apply only what works, i.e., things that have been rigorously field tested. As an organization, SUCAM values campaign experience much more than educational qualifications. (For example, in the SUCAM annual evaluation procedure, long service is given the greatest weight.) This is entirely consistent with an organization which places such a high value on implementation.

In a campaign, covering a community house-by-house is a useful — though novel — way of dealing with communities. The use of the house as a locus of work — by residents, SUCAM personnel, and auxiliary assistants — concentrates attention on a narrow range of household behavior, beliefs, and attitudes. Residents establish personal relationships with a particular *guarda* and his supervisors.

Campaigning not only has a technical significance, but it also has a social significance that can all too easily be overlooked. A campaign is not run as a "SUCAM" campaign; it is in fact a popular social campaign. At the beginning of the campaign — particularly in a new area — SUCAM's mapping process identifies the participants in the campaign. Each house is marked, and the inhabitants see the marking on their houses and are aware of the inclusion of their houses on SUCAM's maps for the campaign. "Their" *guarda* draws the map; and their *guarda* will leave a record of campaign work on each visit, reflecting the householder's own contribution. The community will thus remain involved as active participants in the process until the end of the campaign.

A campaign creates a partnership between SUCAM personnel and the household residents; and SUCAM backs this relationship with intensive supervision. Where health education is important, house visits reinforce the messages in a relevant and easy understandable manner. The *guarda* invests his personal reputation, and is aware that his work will be checked. The work is non-intrusive in a cultural sense — it does not affect existing relationships of power or status, nor does it run counter to important religious or ideological beliefs or values. Furthermore, SUCAM personnel are not in a position of authority over the residents; they must work with the residents and be judged by them and by SUCAM inspectors.

Community links are also strengthened by the recruitment, training, and maintenance of a force of volunteers who are invaluable in a campaign. Volunteerism at the district level has been important in endemic disease control in Brazil; and SUCAM devotes great effort to increasing such auxiliary support. SUCAM's work depends on the cooperation of householders, and this process is facilitated by its force of trained (but unpaid) auxiliary workers. Each campaign recruits and manages its own community volunteers; the total number of such workers for endemic disease control is about 45,000.

Each year volunteers are responsible for 1.5 million blood slides for malaria, over half a million microscopic exams for schistosomiasis, and for providing medicines in over a million cases. Volunteers provide more than half of all the malaria treatment, and notify the redomiciliation of triatomides in areas under entomological surveillance. They are not paid; and the most recognition they receive may be in the form of a calendar!

Campaign control

SUCAM's field operations rely on personal accountability that is based on written instructions that can only be amended in writing. SUCAM believes that work worth doing is worth recording. The methods used for recording the day-to-day work allow supervisors to monitor performance; and also give an accurate picture of how well a campaign is doing. During the early days of a yellow-fever campaign, over 30 percent of the budget was spent on checking the work undertaken by employees.[2] Senior SUCAM personnel estimate that the situation remains the same even now.

The campaign creates and sustains a sense of solidarity between all levels of SUCAM personnel and the community. It expresses, reinforces, and reconfirms the core values and beliefs that have guided SUCAM for over 50 years. The staff's

2. A description of the yellow-fever campaigns of 50 years ago mentions so many forms that it is hard to see how things functioned with a workforce that had low levels of education. Form FA2 was the basic worksheet, Form FA4 was a summary of FA2s, Form 5 was a record of local infestation, etc., until some 30 separate forms had to be filled out and checked. But these forms were necessary because endemic disease control requires meticulous precision and careful repetition. All the early yellow-fever campaign forms dovetailed, so that no worker had to fill out more than six or seven forms. Most workers filled out only two or three forms. The situation is similar today.

comments on campaigns attest to their deep personal involvement: "it was a beautiful experience with the people"; "technically and socially it was very well handled," etc. The campaign is clearly a social as well as a technical phenomenon.

Guarda: *A new kind of professional*

Campaigns could never be a success without the whole-hearted support of the Brazilian public. For this, SUCAM created a new cadre of employees who could enter people's private homes—because it was clear that they had no political or police functions, did not seek or accept tips, were not under the influence of alcohol, were above suspicion of moral misconduct, and applied the same standards to all houses in their zone in an impartial manner. It was known that they had to leave a record of their work in the houses visited, and that this work would be checked by their superiors. The local director of the district service was always accessible to the public, and answered complaints promptly.

The *guarda* represents SUCAM's campaign experience and combines in one person a variety of technical, administrative, and social skills. He has broad cartographic, epidemiologic, and communications skills, and is specialized in the management and treatment of endemic diseases. He does not take orders from technical specialists; instead, as a line employee, he represents several professions and disciplines and answers only to one supervisor. The *guarda* is not simply a poorly educated substitute for the doctor; young physicians in the field are taught by *guardas* and frequently acknowledge how much they have learned.

Managing SUCAM

Personnel management

STAFFING. In 1985, SUCAM had authorization for 50,176 employees. At the end of October 1988, after a retrenchment by the Ministry of Health, SUCAM had 37,835 employees, and was anticipating hiring 410 employees. The retrenchment did not have a major adverse impact on operations; and in any event, SUCAM managers stress the need for a lean organization. Of the total work force, 29,794 were permanent employees. The remaining were temporary employees, employed for up to one year.

The SUCAM work force is made up of:

- 595 university-level professionals, constituting 2 percent of the work force.
- 2,700 field supervisors, with a secondary education (7 percent).
- 30,750 *guardas* (77 percent).
- 5,882 support and administrative staff (14 percent of the work force).

In 1987, turnover was 27 percent among temporary personnel and 4.6 percent among permanent personnel. Among the latter, turnover was highest in Brasilia and in São Paulo. Among temporary employees, turnover was highest in areas offering alternative employment opportunities, e.g., Rondônia. New hires numbered 266 permanent staff and 8,170 temporaries. Dismissals numbered 781 permanent staff and 779 temporaries. Overall, 203 people retired and there were 77 transfers.

TYPES OF APPOINTMENT. Middle- and senior-level permanent employees constituted the bulk of the work force in 1987. There were 379 senior-level and 29,415 middle-level employees — divided into four categories (A, B, C, and S). Incoming employees are expected to serve from three to 16 years in grade A, up to six to seven years each in grades B and C, and the remainder of their careers in grade S, if they progress that far. Retirement is usually after 30 to 35 years' service, depending on the type of appointment held in SUCAM.

There are two broad types of appointment — "permanent roster" and "special roster"; those in the latter category are usually hired to meet specific campaign needs. Because of various revisions in the personnel system, there are a number of different types of permanent employees in SUCAM. The most important of these are the "public health professionals," a category found only in SUCAM, created in 1979. In return for giving up the right to private practice, SUCAM's public health professionals received an 80 percent increase in salary. This change was important, because in Brazil, due to inflation, holding two jobs is the norm. The public health professionals are drawn from a variety of fields — medicine, social science, architecture, etc.

For all employees, there are three possible relationships with SUCAM: (a) as statutory employees, who have been "grandfathered" — they get automatic pay raises, can retire after 35 years, and cannot easily be fired; (b) as consolidated work-law employees, who seem to have few special privileges; and (c) as "exclusive" employees, who are under contract to work full-time for SUCAM

and thus get an extra salary. Special-roster employees are usually hired for less than a year, although some are on yearly renewable contracts.

SALARIES. Not only are SUCAM salaries low compared to the private sector, they are also low compared to the rest of the health sector. The SUCAM base salaries are set in line with similar positions throughout the federal service. The government-wide job classification scheme, which covers SUCAM, was established in 1973. However, by special arrangement, especially well-qualified candidates may upon entry into SUCAM receive a base salary that is considerably higher than the norm. Individuals seem to be encouraged to strike their own salary deals on entry.

An important component of total remuneration is the travel and subsistence allowance which ranges from around Cruzado (Crzs.) 4,700 for *guardas* to more than Crzs. 14,000 for higher levels for each day away from the home work-station. These allowances are tax-free, and in some cases almost double employee take-home pay. Frequently, the base salary constitutes only 20 percent of take-home pay; hence, this allowance, while it has obvious negative aspects, does encourage all levels of the organization to participate in field service.

Besides the base salary, some middle- and senior-level employees receive allowances for shouldering special responsibilities or because of merit. For many employees of SUCAM these additional allowances constitute between 60 percent and 80 percent of base salary. These "gratifications," as they are called, are not a right but a privilege. Not all employees can count on automatically receiving the "gratifications."

Because the additional allowances are allocated by the Ministry of Health, SUCAM is not in a position to offer really competitive — from the perspective of the health sector — salaries to staff that it wishes to attract or retain. Although the base salary for SUCAM employees is not markedly different from that of other government agencies, total emoluments do lag behind. In the health sector, foundations such as Oswaldo Cruz or the Public Health Services Foundation, have the most competitive terms and conditions of service. Next come the special campaigns that are not part of SUCAM (such as AIDS and tuberculosis). In third place are the salaries paid to ministry of health personnel with jobs requiring comparable skills and experience. Finally, at the bottom, is SUCAM. SUCAM managers are aware that their salaries are not competitive, and hope that they will soon achieve parity with the rest of the health sector.

Despite the low salaries, two factors account for SUCAM personnel's effectiveness. First is the prestige and public image of SUCAM, as a consequence of over 50 years of effective field service. SUCAM is an organization that people are proud to work for; and the work is considered worthwhile. Those contemplating leaving invariably speak of a major sense of loss. The second factor is the SUCAM employees' commitment to public service. They believe deeply in the importance of such service, consider the work important, and want to keep doing it.

SOCIALIZATION. To understand how and why SUCAM operates the way it does, it is necessary also to examine how the values and beliefs held by SUCAM personnel are generated and maintained. This means looking at such aspects as socialization, training, and professional activities.

In disease control activities, precision and specificity are a must. In SUCAM, employee responsibilities are clearly laid down and clearly understood. No shortcuts are allowed; people are expected to do their jobs in the way they have been trained. If they do not perform or if they break the rules, they are often dismissed. About 1,500 employees are dismissed every year; and of these half are "permanent" employees.

SUCAM spends a great deal of time socializing new entrants to the service. They are taught to accept discipline and the importance of teamwork. SUCAM employees are expected to behave in a professional manner. Professional norms have become institutionalized over the past 50 years. The imposition on the work force — and the acceptance by them — of a rigid standard of discipline is a commonly remarked-upon fact.

Usually, medical organizations adapt to the professional norms of medical schools. In contrast, SUCAM expects graduates of medical schools to conform to SUCAM's unique needs. Individual professional aspirations are expected to be subordinated to the needs of the organization. Graduates who have been trained to work in a conventional environment as leaders of medical teams are expected to learn how to work with (and under) others.

SUCAM pays new physician entrants a special allowance to compensate for not being able to practice "medicine." They are required to give full-time attention to SUCAM's needs. With time,

this allowance no longer compensates for the loss of private income, but despite this hardship the physician turnover is low. This is a striking example of the subordination of professional norms to organizational requirements.

SUCAM considers medical graduates to be too narrowly trained in public health clinical medicine to be immediately useful. They have to be retrained to make them useful for SUCAM — their knowledge of endemic diseases is too shallow, their emphasis on theory too out of place, and their understanding of their role in disease control too rudimentary. SUCAM often spends 10 to 15 years grooming these young men and women. Young professionals serve in a variety of field and headquarter positions in order to gain the necessary broad experience. Those unable to accept the challenge of moving from staff to line positions and from field to central assignments (and vice-versa), are encouraged to leave.

Thus, SUCAM has institutionalized a unique perspective on professional "specialization." SUCAM's technical professionals are broad-gauged public health specialists, not narrow specialists. Young professionals are exposed to practical problems of trying to apply technical knowledge to operational situations. Specialized staff are trained to appreciate that implementation is the top priority, and that their contribution must help improve operations.

TRAINING. The central office organizes seminars, panel discussions, meetings, and other training activities in collaboration with research and teaching institutions. Employees at higher levels are trained first, and are expected to pass on the training inputs to lower levels. In addition, regular training to maintain and sharpen skills is conducted every year. Training of district staff is undertaken by technical specialists from Brasilia.

Training in SUCAM is a cooperative venture between superiors and subordinates. Senior technical staff from Brasilia travel regularly to the field to provide on-the-job training. They concentrate initially on district-level inspectors. These inspectors train the chiefs of the various teams of guardas, who in turn train the *guardas*.

Training enjoys high status within SUCAM. It is something all employees are exposed to on a regular basis, both as participants and as trainers. Field personnel responsible for the execution of campaigns are regularly trained. Headquarters staff regularly spend time in university settings and with research institutes. In addition, encouragement is given for overseas training; and often it is the best people who go for training.

PROFESSIONAL DEVELOPMENT. Employees are encouraged to help maintain SUCAM on the cutting edge of disease control by participating in professional meetings, attending international conferences, and publishing in professional journals. The atmosphere is that of a good university department.

SUCAM management has carefully fostered this sense of intellectual curiosity. They have opened a small museum in the main office to highlight the main developments or milestones in the history of Brazilian disease control. This kind of activity focuses attention on the organization's achievements and status in the disease control world. It produces and sustains a sense of elitism, of being a member of a special body of men and women.

There is great regard for long service (20 to 30 years) employees. Experienced professionals can see how the whole disease control operation fits together. Headquarters personnel and departments have unrivalled technical authority. They travel frequently to the regions, keep abreast of developments and ensure that they are able to make informed decisions in Brasilia.

This cadre of experts helps shape campaigns, both in formal terms by advising the superintendent, and informally by talking to colleagues at the regional and district levels. The frequent travel helps ensure a common understanding and approach. The hard work put in by senior staff, and their experience and dedication, are greatly appreciated.

Within the headquarters' departments, there is little formality in work relationships, and teamwork and a multidisciplinary approach to problem solving is stressed.

Division of work

SUCAM is required to "supervise, orient, coordinate, control and execute by following plans financed and approved by the Ministry of Health." These actions are expected to result in the "eradication and control" of endemic diseases from the national territory (Article 8 of Portaria no. 161). The relationship between the superintendent of SUCAM and the minister of health is close — the minister sets broad policy guidelines within which SUCAM must operate, but does not give detailed instructions; the superintendent must propose. The minister can decline to authorize funding

beyond a certain level or to sanction manpower increases, but he does not specify in advance how resources are to be used.

The SUCAM "cabinet" assists the superintendent with external political and social relations, while important internal matters are handled by the coordinator for planning, budgeting and control. SUCAM's global planning requires aggregating and assessing plans prepared by the various districts. This means evaluating ongoing program activities, assessing resource allocation options, keeping the superintendent informed of progress and problems, liaising with the Ministry of Health where necessary, and monitoring expenditure control through SUCAM's electronic data processing systems.

The relationship between the 26 regional directors and the superintendent is similar to that between the latter and the minister of health. Under Article 90 of Portaria no. 121, regional directors are expected to prepare and submit for the superintendent's approval, plans for the eradication and control of disease in their regions. They are to coordinate, organize, execute, and supervise, in accordance with approved plans. They are expected to propose modifications when necessary; maintain laboratory facilities; submit regular technical accounts; and produce an annual report detailing what they have accomplished.

The relationship between district directors and regional directors (each of the latter works with three to six district directors) is similar to the relationship between regional directors and the superintendent. The district director has the authority to execute all approved plans within his district and to propose changes when technically necessary. The district director is not told what he should do; instead, he must propose a program of work to higher levels of SUCAM.

Each regional directorate is responsible for the implementation and coordination of activities in its own state or territory. The directorates are expected to consolidate district-level planning and are in charge of supervision and control. Small directorates that do not have any district offices implement health activities directly.

Each of the campaigns has a section for field operations, whose functions are "supervising and coordinating surveys and spraying activity in accordance with established technical norms." They are also expected to develop materials for guiding field personnel and to collect and analyze the results of various campaigns.

Delegation of authority

While SUCAM demands obedience, it also expects individual initiative and creativity. The process of giving orders emphasizes objectives to which all are committed. The superior and subordinate work with each other on a task both consider important. This collegial approach, despite the highly structured environment, is possible because of well-developed interpersonal skills, and because both superior and subordinate have a clear idea of what they should be doing.

A further reason why inflexible orders are not given is that SUCAM realizes there can be no perfect orders. Ultimately, in the heat of a campaign, success depends on decisions taken by local campaign managers. It is for the same reason that the training of professionals emphasizes confidence in their own decisionmaking ability.

A second aspect of delegation in SUCAM is that policy, strategy, and tactics are clearly distinguished. SUCAM headquarters is responsible for translating Government policy into strategy. A declaration of war on endemic diseases is a declared policy of the Brazilian Government; the decision to mount a campaign in certain areas, or on certain diseases, is SUCAM's strategy.

Districts are concerned with tactics. Tactical issues deal with how implementation should be planned and managed — the details of a campaign; the actual staffing of operations; the sequencing of activities. District directors are concerned with basic administrative procedures, the achievement of flexibility, and the inter-campaign allocation of financial and personnel resources. The district level is concerned with the "right" distribution of equipment, and the "right" amount of attention to large and small details.

Because a clear distinction is made between strategy and tactics, micromanagement is avoided. People at headquarters do not try to manage district activities or the minutiae of campaigns. Micromanagement is also avoided because the giving of orders is more a process of seeking agreement among professionals than a command from a superior to a subordinate.

Furthermore, SUCAM policymaking works because it is not isolated from operations or from the realities of implementation. Policy is not something the minister makes on his own — he relies on SUCAM's contribution, based on its operational experience and judgement. The policy process works because SUCAM makes a clear distinction between strategy and tactics; and en-

courages individuals to make tactical decisions.

Financial management

BUDGET SIZE AND SCOPE. Cost is a major consideration in designing a campaign. During an emergency, funds are relatively easy to obtain because public attention is focused on results rather than cost. The emergency nature of endemic disease campaigns is recognized in Articles 116-124 of Portaria no. 121. When in the superintendent's judgement circumstances so warrant, he can change the allocation of funds and manpower among campaigns. However, subsequent phases of a campaign — focused on interrupting transmission — have to be designed within the funds available in the yearly budget.

SUCAM faces great difficulty in budgeting because its operations depend on timely availability of equipment, drugs, and supplies, many of which are imported and thus require hard currency. This makes SUCAM's operations extremely dependent on timely National Treasury releases. While international financing can help solve these problems, it cannot eliminate them. In many other organizations, the absence of supplies can be a major handicap but not the end of work (e.g., a number of education activities can still be pursued in schools). In disease control, without supplies there is no program.

In real terms, SUCAM experienced a 40 percent reduction in resources between 1978 and 1981. Despite steady increases in the incidence of endemic diseases, particularly in Amazonia and the northeast, SUCAM's resources were further reduced by 30 percent in 1981-85. However, under the 1986-89 National Development Plan I, provisions were made to increase funds for endemic disease control.

The SUCAM budget has increased from about $U.S. 727,000 in 1986 to a projected $U.S. 1,327,000 in fiscal 1989. The largest program item is malaria, with almost 40 percent of the budget. Yellow fever and Chagas each receive about 20 percent of the budget, schistosomiasis and leishmaniasis each get about 8 percent, and the remainder goes to trachoma and goiter. About 50 percent of the SUCAM budget goes for personnel expenses.

THE BUDGET PROCESS. Endemic diseases present special problems for budgeting, especially for forward budgeting. The actual phasing of shifts from the attack to consolidation phase, or from consolidation to maintenance, are hard to predict. It is, of course, equally difficult to predict when a new attack phase might be required for one of SUCAM's many disease campaigns.

Annual campaigns, whose size and shape are determined by district operations, drive the annual programming and budgeting process in SUCAM. Although a medium-term plan (from three to five years), and a longer-term plan (from 10 to 15 years) are prepared, greater emphasis is placed on programming annual campaign activities and in assessing their budgetary implications. (The financial year matches the calendar year).

SUCAM's experienced line management shows considerable skill in managing the budget process. Although resources are tight, they manage to husband a little extra here and a little there so that they can reward outstanding achievements. The budgeting is not incremental — good performance is rewarded; and resources are increased in areas where the campaigning is weak.

The cost of SUCAM services to populations at risk is between $U.S.1 and $U.S. 2 per capita per year. Despite inflation, SUCAM has managed to secure an adequate level of funding in recent years, representing between 20 percent and 25 percent of the Ministry of Health budget. Compared with other developing countries, this is a healthy situation. When coupled with sound procurement policies that allow some forward purchasing, supplies are usually available where and when they are needed.

Cost reductions are always difficult for well-run organizations, particularly when personnel emoluments consume half the budget. Although SUCAM can increase or decrease its work force from year to year, the effect of any budget cuts during the year is to lay off workers at the district headquarters — because of shortfalls in funds to pay allowances or to procure insecticides or other commodities.

The multiplicity of campaigns run by SUCAM every year lends an element of stability to budgeting. By shifting funds between the various phases of a campaign, as well as among campaigns for the different diseases covered by SUCAM, a roughly stable aggregate budget is possible from year to year. Nevertheless, SUCAM officials have learnt from experience that while funds are not difficult to secure when an epidemic is on, expenditures must be significantly reduced during the maintenance phase.

ANNUAL BUDGET CYCLE. In August of each year, the superintendent calls for estimates of program

activity for the following year. The "bids" from various districts are based on their best assessment of the present situation and of likely future developments. The district bids are aggregated at the regional level but usually are not significantly changed. The bids sent to the superintendent are split into two categories: (a) the technical estimate, which goes to the department for eradication of endemic diseases; and (b) the resource estimate, for men and materials, which goes to the coordinator for planning and budgeting.

In evaluating the bids submitted by the districts, the superintendent's staff face several constraints. First, they know that increases are not always possible; and in any case, they do not know what funds will be provided by the Ministry of Health. Second, there are ongoing overriding priorities whose call on resources must be assessed. These imperatives are dengue in large metropolitan areas and malaria in Amazonia. Third, they must try to assess the impact of inflation on the bids. None of these constraints is easy to resolve.

The technical staff of the superintendent evaluate the bids using the data which have come in on a monthly basis throughout the year, the results of quarterly campaign reviews, and global information which is not available at the district level on such factors as disease foci and migration. The Brasilia office constructs two scenarios for each district — an ideal projection of what should happen based on technical requirements, and a probable scenario based on operational realities. Toward the end of the year, the technical staff also have available annual reports from the districts which give another valuable reading on operational requirements.

Technical requirements are then matched with operational requirements, and are compared to the submitted bids. (In most years the bids from the districts seem to be inflated by about 30 percent.) Negotiations then take place with the Ministry of Health for two separate authorizations — for money, and for additional staff (if needed). Allocations are announced at the beginning of the year. Hiring takes place in January, when procurement of equipment and supplies is also initiated.

Programming for most campaigns is on a 12-month basis. Control activities for malaria, Chagas, leishmaniasis, schistosomiasis, goiter, and filariasis continue throughout the year. Trachoma control activity is concentrated in the dry season; plague becomes important at the end of the dry and rainy seasons in affected areas.

In June, a meeting of division and department directors reviews progress to see if mid-year adjustments are warranted. These adjustments can be made without formal approval from the Ministry of Health. If disease conditions change during the year, the superintendent can also draw on SUCAM's special fund, with the concurrence of the Ministry of Health.

SUCAM has an annual budget, with monthly adjustments for inflation. Forward procurement of commodities required for campaigns is attempted, to partially offset the adverse effects of high inflation. However, in recent years, inflation has greatly increased the workload of managing financial resources. In previous years, expenditure reporting and review was on a monthly basis. It is now on a weekly basis. Instead of an annual budget with a mid-year correction, there are now, in effect, 12 monthly mini-budgets.

Transportation

Efficient and affordable transportation is vital for disease control. In 1986, SUCAM had 3,505 four-wheeled vehicles, 1,082 jeeps, 2,211 pickups, 85 trucks, 72 automobiles, 55 general-purpose vehicles, 8,200 two-wheeled vehicles, 1,139 motorcycles, 7,000 bicycles, 200 powercraft, and 39 boats with outboard motors. This is obviously a large fleet of vehicles; but it is well maintained.

Reasons for success

SUCAM is recognized worldwide as a well-managed and effective disease control organization. Its main features have been discussed above. Additional underlying reasons for success are discussed below. These are: accountability for results; emphasis on adaptation and innovation; careful attention to staff and line functions; and structure and organization.

Accountability for results

SUCAM's programmatic division of work makes strict accountability possible. Each disease control program — for malaria, schistosomiasis, and so on — is a discrete management unit. Each program has its own manager who controls all the resources he needs, including his budget and personnel. Furthermore, there is a manager at each level of SUCAM accountable for results. He knows what objectives he must achieve and how. The budgetary system reinforces the assigned functional re-

sponsibilities.

Management has all the information it needs to monitor and evaluate each program's performance. Such monitoring (especially of financial disbursements), is undertaken on a monthly basis or quarterly basis, as needed.

Most campaign programs (e.g., malaria or Chagas) have three levels of management accountability, with matching levels of expected performance and budgets. The budget at the national level is for technical research and supervision, for offering field-related training, and for extension work. The inputs for this work can be (and are) specified with some precision in terms of staff time, university and other contracts, and so on. The outputs can also be specified and observed. Usually they are technical manuals dealing with the campaign subject matter, field administration manuals dealing with what workers must do to effectively combat the disease, and training courses which prepare field workers to meet their technical responsibilities.

SUCAM's budgeting at the national level is sophisticated — it stresses what is to be achieved by the expenditures, rather than, as is often the case, concentrating solely on the appropriateness of expenditures and whether all the rules and regulations have been satisfied. Equally important is the match between managerial accountability and authority over resources.

The second level of program budgeting is the regional level from where district-level operations are supported. Here too, the regional director is personally in control of and accountable for the results he must produce. Both the outputs (e.g. number of slides examined, etc.) and the costs are quantified.

The third level of budgeting is the district-level where the director has the funds and the accountability for campaign execution. In terms of the SUCAM budget process, it is the district-level budget whose size, shape, and phasing determines the budgetary requirements of the support and technical functions performed at higher levels of the organization.

Adaptation and innovation

Technological adaptation. In SUCAM, the tradition of relevant research is still very strong, although the advantages of pure research and the development of cost-effective chemotherapy are also appreciated. Research is a "horizontally" managed process relying on collegial activity and on individual creativity and responsiveness to SUCAM's operational needs. Technical research is embedded in, and inextricably combined with, complementary social and administrative research. Research activities are not developed first, and then adjusted or adapted to fit their required setting.

Research contributes directly to campaigning. SUCAM's attitudes toward research were established in the 1930s during the yellow-fever campaign in a manner that is still operative. As part of the campaign, it was deemed necessary to perform autopsies to get liver samples while bacteria were still active. The logistics were quite beyond the resources of the physicians working with the yellow-fever campaign. Hence, in 1930, the campaign invented its own surgical instrument to perform a "viscerotomy." The instrument was patented, and despite many people's reservations, *guardas* were trained to do the viscerotomies; and over 150,000 were performed.

More recently, malaria control in Amazonia was hampered by the fact that rural dwellings often had no walls and thus it was difficult to apply insecticide. SUCAM field personnel, working closely with researchers, developed a curtain impregnated with long-lasting insecticide.

Personnel adaptation. Based on its campaign experience, SUCAM has painstakingly developed new public health personnel categories. Realizing that neither universities nor other educational institutions could supply personnel trained in the variety of tasks required for campaigning, SUCAM has created three new categories — the public health professionals, sanitarians, and the *guardas*.

These "specialists" are broadly trained to provide generalized support to campaigns. They look at implementation requirements in a broader context, in accordance with instructions of line managers.

Staff and line functions

Both staff and line. SUCAM uses "staff" for horizontal management. It has about 390 staff positions, at various levels (headquarters, regions, and districts). SUCAM takes 10 to 15 years to produce a staff person, rotating each of them between line and staff positions, and giving them considerable campaign experience. SUCAM's staff are its repository of experience, and have much accomplishment to their credit. When they give advice, others listen, because they are trained to have a broad point of view and can see all sides of an issue.

In a sense, the "staff" are really an extension of line management — they do the planning and prepare proposals for the line managers (including the superintendent). If he approves them they go out as his decisions. Thus, at all levels, SUCAM "staff" make intelligent command possible by procuring and arranging information and working out technical advice in detail; and they make the intelligent execution of commands possible by keeping all the separate actors advised of the parts they are to play in the general scheme. As part of their responsibilities, they work out epidemiological trends, keep abreast of research developments, work out the details of SUCAM's plans, take care of procurement planning, etc.

Work relationships and communication between "staff" at various levels are advisory and consultative in nature (and are best indicated by a dotted line). The staff at higher levels in SUCAM cannot give orders to lower-level staff. Furthermore, "staff" are always subordinate to line managers at their own level. In SUCAM, the most important campaign functions are under the line managers who control and direct the campaign with advice from staff.

This line/staff distinction is formalized — "staff" are required to write down their major advice in technical and administrative manuals and to update these regularly. Thus, the staff too have an important responsibility — because the manuals are crucial for effective campaigning.

In addition, SUCAM's staff organization never gets much larger than 400; and this means that "staff" know one another. This familiarity facilitates communication among staff wherever they are posted in the organization. Besides, they have all been exposed to the same training in SUCAM, and share the same professional norms.

TECHNICAL MANUALS. As noted above, the "staff" contributes directly to the translation of SUCAM's mandated functions into action. Technical requirements for disease control are written up in "ideal-scenario" manuals, which are then adjusted by line managers to fit "actual" local requirements with the help and advice of staff.

For each endemic disease, the technical manuals produced in Brasilia by central technical staff are periodically updated. For example, the Chagas manual on "operating norms for technicians" was issued in 1979, and substantially revised in 1987; the manual for schistosomiasis was issued in 1956, and substantially revised in 1981; the manual for malaria was first produced in 1967 and has since been revised several times. Similar manuals have been produced for other diseases as well.

The technical manual is a guide to action, and is meant to be used flexibly. It is based on sound principles of field administration and entomology, is comprehensive, and is written in simple language. Its regular updating on the basis of research findings and campaign results is the responsibility of SUCAM's technical staff at headquarters.

Brasilia is also responsible for the production of an "ideal" scenario for administrative and household behavior issues. Accompanying each technical manual is a detailed administrative manual for field operations. The latter is also regularly updated by Brasilia in the same manner as the technical manual. Besides these specialized manuals, there are administrative manuals on epidemiology and the use of insecticides. Each manual is issued after field testing, ensuring that the methods can be used under a variety of conditions.

Structure and organization

STRUCTURE. An organization's "structure" constitutes the "givens" — i.e. the set of conditions or rules of the game — within which management must take place. These "givens" include laws, policies, and mandated functions; roles, duties and responsibilities of individuals and units; performance expectations and personnel management regulations; and budgeting and procurement regulations.

SUCAM's structure provides the essential element of "verticality" that allows the imposition and maintenance of a uniform set of technical standards throughout the large organization. Its structure makes possible the application of hierarchical power and authority in the legitimate and quite impersonal manner made famous by Max Weber. At the regional level, the structural "givens," and the discipline they require, make for a degree of uniformity that is necessary.

In addition, at the national level, lateral coordination is maintained with key ministries (agriculture, education, interior and so on). At all levels, SUCAM has ongoing collaboration with agencies involved with urban sanitation, water supply, irrigation and Indian health and resettlement matters. Considerable time is also spent on working with other parts of the Health Ministry. At the state level, coordination is close between SUCAM and the State Secretariats of Health.

These are the institutionalized parameters for organizational activity. Policies are followed, and disciplinary breaches are dealt with "according to

the book." SUCAM's institutionalized requirements have been in existence for almost 50 years; and tradition has a certain weight that is both recognized and accommodated.

ORGANIZATION. However, structural "givens" are only part of what makes SUCAM work. Cooperation is also obtained from people not subject to SUCAM line authority. While rules indicate what is not to be done, they don't indicate what is to be done. What makes the structure function is the "organizational" element, the area of choice. Disease control is critically dependent on choices made within the rules. This is where the management process looks for initiative and creativity; and where teamwork makes a difference.

"Organization" in SUCAM often involves an appeal to the professionalism of individuals who are treated as colleagues rather than as subordinates. Such approaches help with coordination, consultation, and negotiation, both within SUCAM and across sectors and government organizations.

Furthermore, SUCAM's "staff" know when it is best to operate by means of consultation and negotiation and when a direct order is required. They are concerned with both modes of operation.[3]

Concluding remarks

SUCAM is an implementing organization. Two of its overriding characteristics bear reiteration:

Implementation-driven policy processes

Policy is generated by campaign results. It is funnelled into campaign action by a series of institutionalized processes that go (downwards) from broad policy to general disease control strategy to specific tactics. The lessons of experience are then channelled back (upwards) through the organization to generate new policy.

3. SUCAM "staff" are thus truly "...specialists...who occupy positions which are so designated that they may give aid and advice to superiors in important technical matters relating to policies, strategy, and procedure. They issue no orders; neither do they...control performance. From them suggestions move up to superiors in whom rests the power to transform such suggestions into orders, which, in turn, flow down through the line. The fact that the suggestions of the staff, when transmitted upwards, may be expressed in final form in no way lessens the importance of this important observation." (Petersen and Plowman 1948:260-1)

Adaptive professionalism

Positive and negative sanctions are employed to encourage (or discourage) particular types of behavior. A number of professional role models are available for new entrants to the service. Personnel management innovations have been critical to SUCAM's success. These have been: (a) the creation of a special position for "staff" and *guardas*; (b) maintaining a sense of elitism among professional cadres; and (c) overcoming the gap between generalists and specialists.

The SUCAM experience highlights the importance of institutionalized professional values. Once these are in place, the structure, organization and procedures can be more easily designed and managed. SUCAM has also invested heavily in personnel training and development. It depends on the staff's ability not only to differentiate between structure and organization, and strategy and tactics, but also to switch from one to the other depending on circumstances. This switching relies on the well-developed "staff" cadre.

Annexes

1 Historical evolution of endemic disease control in Brazil

In 1907 Oswaldo Cruz created an experimental pathology institute at Rio de Janeiro. This institute developed strategies and techniques for dealing with yellow fever. When yellow fever broke out in Rio de Janeiro in 1929, it was controlled through methods developed by the Cruz Institute.

Following this unexpected outbreak of yellow fever, the Brazilian Government realized that a permanent nationwide campaign was needed. It created a Yellow Fever Service in 1930. Field staff of the Yellow Fever Service wore a distinctive uniform which made it easy for the public to recognize them. The inspector wore a numbered badge with a federal Government crest. A zone inspector had to hang his flag outside the house or housing block where he was at work. Thus, he was easy to find if his superiors wanted to check on his performance. Dengue campaigns still follow this tradition.

During the next 10 years, new control techniques for rural and urban areas were worked out by the Brazilian Government with the assistance of the International Health Division of the Rockefeller Foundation. The Rockefeller Foundation had been

engaged in anti-*Aedes-Aegypti* work in northeast Brazil since 1923. Brazil's collaboration with the Rockefeller Foundation on this work lasted until 1940.

During the years 1929 to 1940, as experience with the organization and management of the yellow-fever campaign grew, an administrative manual of the Yellow Fever Service of the Ministry of Education and Health was gradually put together. The idea was to record what was necessary for the setting up of a permanent campaign rather than continuing with the ad hoc administrative measures which had characterized campaigns in Brazil up to that point.

In 1930, a Northeastern Malaria Service was created to help with outbreaks of malaria caused by *Anopheles gambiae*. The Rockefeller Foundation was again involved in this effort. *Anopheles gambiae* was eradicated in 1941. The regional malaria service was eventually combined with the National Department for Rural Endemics in 1956. The Government had created the Campaign Against Bouba in 1943; the National Service for Helminthiasis in 1944; and the National Campaign against tuberculosis in 1946. The campaign against Chagas disease started in Minas Gerais in the 1950s. In 1946, urban transmission of yellow fever was halted; and in 1956, the National Yellow Fever Service was replaced by the National Department for Rural Endemics.

2 *Campaigns directed at houses*

At the beginning of a campaign, work areas are first divided into zones (or *sitios* in rural areas). The size of the zone has to be such that a *guarda* starting work on Monday morning will be able to complete his visits by Friday afternoon, thus leaving Saturday morning for any houses that have been locked-up during the week. The nature of house construction (i.e. whether single or two story), the spacing between houses, and so on, are considered in the initial demarcation of zones. Zones are adjusted after six months, and surveys are repeated at intervals of not more than a year.

A *guarda*'s itinerary is defined by the inspector. Five *guardas* make up a team under a chief of guards. Five chief *guardas* are under the control of an inspector. Five inspectors are under the control of an inspector-general. The number of inspectors general is determined by the size of the district and the campaign activity being undertaken. The span of control in SUCAM field operations is seldom more than six; and five is the preferred number.

The number of houses in a zone depends on the nature of the terrain, the methods of construction and the control work that has to be done. Experience suggests that urban *guardas* can, on a daily basis, map 40 houses, capture mosquitoes in 20 houses, and spray 12 houses. In rural areas, the *guardas* can in a day map 20 houses, capture mosquitoes in eight to 15 houses, and spray four to eight houses. SUCAM estimates that households contain, on average, five people.

A fixed itinerary is plotted in advance for each *guarda*. The point at which the *guarda* begins work is marked with a pin on the map at district headquarters. Different colored pins are used for different modes of transportation: blue by water; red motorized; yellow on foot; green on horseback. The guarda has no excuses if he is not found where he is supposed to be on any given day.

The *guarda* fills out a daily form indicating which houses he has visited, the conditions found, and the actions taken. Additional forms are used: to notify residents of houses which were found to be closed so that they could leave keys with a neighbor; to request special spraying to kill mosquito larvae; or to inform absent householders that they should follow certain advice.

The inspector leaves his itinerary at district headquarters. This indicates the zones he intends to check and the approximate times of his visit. Should the technician in charge wish to visit him in the field he can find him.

The *guarda* is expected to discover places where vectors are breeding, destroy the foci found, and prevent the formation of other foci. Special teams are formed to capture mosquitoes and other vectors during later stages of the campaigns, and to deal with really inaccessible breeding spots such as gutters and hidden water tanks. District inspectors are responsible for checking the work of zone inspectors on a regular basis. They do this by inspecting all the *guardas* on a regular basis. The chief inspector is responsible for the maintenance of personnel records of all permanent staff.

Concentration on the house for application of SUCAM technology focuses attention, in a precise and relevant manner, on the aspects required to be covered as per the control program's technical manuals. Staff can concentrate on the narrow range of health behavior that needs to be affected; and can monitor the campaign roles and responsibilities of *guardas*, auxiliary health workers, and other SUCAM employees.

The household provides a "control area" for

vectors; and a workplace for the *guarda* and inhabitants to work together. There is a degree of symmetry between the expectations of the householder and the *guarda*. For the householder the effort required is minimal and fairly risk free; neither literacy nor numeracy is required.

3 *Mapping houses*

A SUCAM campaign begins with the mapping of localities where the campaign will be conducted. Form RG-1 is for geographical reconnaissance. It is of a summary nature, and is filled out by the *guarda* after he has completed the survey. Besides a general description of the location and its proximity to other locations, the form deals with access (i.e., by what means), and sanitation (running water, means of garbage disposal, how residents get their water and how they bathe). It also deals with the nature of health assistance nearby (school, church, health post, etc.); how people get their news (radio, papers, etc.); and the nature of local authority (delegate, judge, etc.).

Form RG-2 is a summary of the mapping exercise itself. It is filled out by the *guarda* who has undertaken the mapping. The form places the locality in a municipal, district, and regional context. It lists the family head of all the families in the locality; numbers the houses; and gives the number of inhabitants, the number of rooms in each of their houses and a counting of any annexes. It also gives the material of construction (e.g., wood, stone, and adobe); describes water availability (e.g., inside, public fountain, etc.); and describes lavatory arrangements as well as garbage disposal habits.

SUCAM maps are extensive; and SUCAM has mapped most of the houses in Brazil at one time or another. SUCAM certainly has mapped every house in campaign areas. Maps are made by the *guardas* and are often used by other agencies because the information they contain is very accurate and is kept up to date. As maps, they have unique features: they do not use the magnetic north, but instead are oriented toward the rising sun; nor do they contain precise measurements of height or distance.

The *guarda* who visits a locality for the first time to draw a map begins by standing with his arms outstretched facing the sun. He draws the sun at the top of his map, at the same time recording any features of significance on the horizon, such as mountains or a town or river. He then draws what is behind him, and makes a note of what town is such and such kilometers from his rear. He then repeats the process using his outstretched arms, so that there is a record of what he sees on his right and also on his left. The *guarda*, having completed a rough mapping of the cardinal points, then prepares to enter the locality. Where there is a main road through the locality, he identifies and labels the first house on the left as house no. 1. He actually places the number in indelible ink on the wall of the house. In years past a lumberman's pencil was used; now, despite painting, most houses in a campaign area have easily recognizable numbers.

The *guarda* then crosses the road and labels House no. 2, again writing the number on the wall so that he can follow the same route when he visits during the campaign. This also makes it possible for his supervisors to quite easily know how to find him and what route he should have followed. When he reaches the end of the locality he places a sign on the last house.

The mapping is updated each time the *guarda* visits. Should a house disappear or new houses be added then he adjusts his map by indicating additional houses to represent the changes. Precisely the same system is used in rural and urban areas, and it can deal quite easily with apartment blocks. SUCAM also puts a register in each house, usually on the back of the front door. On this the *guarda* or inspector who visits the house notes the date and time of his visit and the purpose of his visit.

Based on the mapping exercise and results of previous campaigns, SUCAM's district technicians can focus on the physical aspects of the household, and the suitability of different types of construction for different vectors. It is the presence and behavior of the vector in relation to the household — or in close proximity to the household — that SUCAM staff seek to influence. Therefore, SUCAM technicians at the district level — and their counterparts at the regional level — target their control methods and message at the behavior of vectors in the household, and at the behavior of residents in the household.

The use of mapping for defining a specific workplace for implementation is not confined to district campaigns directed at households. SUCAM also relies on its mapping techniques for pinpointing and controlling mollusciciding work (and in its work on trachoma). Additional maps are produced on the basis of aggregated data to show how campaigns are proceeding. These maps make extensive use of color to show disease prevalence, attack stages, and so on.

The way in which SUCAM depends on paperwork can be illustrated by the 12 forms required for schistosomiasis control. The following forms are routinely completed: Form 101 is a record of the *guarda*'s visits in a campaign area, and gives details of localities, population, number of houses, microscopic exams, treatment given, molluscicidina, and any comments; Form 102 is the laboratory result of exams conducted in the localities mentioned in the previous form; Form 103 is the daily record of treatment; Form 104 is a record of malacological analyses; Form 105 is a record for infected persons, giving their residence and work location; Form 106 is the supervisor's record; Form 107 is a monthly locality summary of microscopic exam results and treatment; Form 108 is the monthly locality record of malacological work; Form 109 is a municipal and regional monthly summary of microscopic work and treatment; Form 110 is a monthly regional summary of malacological work; and Forms 111 to 114 are summaries of disease levels at the beginning of the campaign phase and at the end. In addition, PCE models 1 to 5 test the weekly and monthly output of laboratories, in order to revise, where necessary, the epidemiological assessment of prevalence which may trigger a change in campaign phasing.

There is also record-keeping for auxiliary workers. The epidemiological *guarda* fills out and submits to his inspector a form notifying him that a notification post has been established. This form gives the name of the auxiliary and where he or she is located, together with an indication of the hours that the volunteer is prepared to work. The second form is filled out by the auxiliary, in two parts, when sending a blood sample to the laboratory. One part goes with the slide; the other is retained for later enumeration. The auxiliary sends in a monthly reckoning of all active and passive cases encountered. The *guarda* send in a monthly accounting of all the auxiliary work, giving the locations and the number of blood slides collected. In this way, both the work of the epidemiological *guarda* and the auxiliary are monitored.

The paperwork serves as a record of completed work. Thus, it is possible to determine where any worker was a year or six months ago, what he was doing, and what the outcome was. It is possible not only to assess the volume of work, and to relate that to particular geographical areas, but also to make judgements about the quality of the work. Comparisons of output can be made between areas having similar campaigns, similar types of houses, and similar settlement patterns and terrains.

The paperwork also serves as a reminder of work that has to be done within a week or a month. It indicates what has to be done, where, and who is expected to do the work. The paperwork not only serves as a check on work done, it also makes possible an assessment of the supervision provided.

It is impossible for the inspector to cover up the work of an ineffective *guarda* because his own work and reputation are also checked on a regular basis. Inspectors make two types of visits to *guardas* — the check visit and the revision visit. In the latter, the inspector observes the *guarda*'s technique and helps him improve his performance. These training visits are especially useful with newly appointed employees. The check assesses the accuracy of the guardas' work.

In sum, SUCAM's paperwork expresses and reinforces the belief in meticulous execution of control measures, and strict adherence to work schedules. The paperwork demonstrates and asserts the importance of discipline. It emphasizes the need for the steady unspectacular application of the tried and the tested where each must do his duty.

2

China: Schistosomiasis control

Introduction

This case study focuses on China's large and complex schistosomiasis control program. Program data are presented in four main parts: strategy, organization, management, and future expectations. It provides an overview of the control strategy and achievements over the past 30 to 35 years; examines in detail the program's organization at various levels; discusses planning, management of human and other resources, and implementation of field operations; and outlines recent developments and requirements for the future.

Note: This case study was prepared by Paramjit S. Sachdeva and Bernhard H. Liese, the World Bank, based on a mission to China in 1989. Assistance provided by the staff of the schistosomiasis control program in China, especially Drs. Chen Ming Gang, Xie Zhimin and Xia Cheng; secretarial assistance provided by Carol Knorr and Jeffry Pickett, the World Bank; and funding by the Edna McConnell Clark Foundation (grant number 04687) and the World Bank are gratefully acknowledged. The views expressed herein do not necessarily represent the official position of the World Bank, Clark Foundation, or Chinese Government officials. This study draws upon a number of background reports and documents, including Chen Ming-Gang, "Schistosomiasis Control Program in the People's Republic of China: A Review," *Southeast Journal of Tropical Medicine and Public Health* 20(4) (1989):511-7.

Program strategy and results

Control task and strategy

China's schistosomiasis control program was officially launched in 1955, six years after formation of the People's Republic. A national survey in 1956 found that schistosomiasis due to *S. japonicum* was endemic in the Yangtze valley and in areas south of it, covering a 2 million-square-kilometer area in 10 provinces, the municipality of Shanghai, and the autonomous region of Guangxi. A total of 373 counties and cities were found to be positive for both schistosomiasis patients and the intermediate host, *oncomelania* snails. Of the more than 100 million population at risk, almost 10 million were infected. Zoonotic infection among domestic and wild animals was also epidemiologically important, with at least 1.2 million cattle infected. The infected snail habitats covered a large area, over 14.5 billion square meters.

Based on the epidemiological pattern of schistosomiasis and the ecological distribution of the vector snails, three types of endemic areas were identified, as follows:

Stratification of endemic areas	*Infected persons (%)*	*Snail habitats (%)*
The plain region	33.3	7.9
Mountainous and hilly regions	22.8	10.0
Marshland and lake regions	43.9	82.1
Total	100.0	100.0

The control task and strategy were then tailored accordingly. A mix of operational approaches was selected, with initial emphasis on transmission control through environmental modification and molluscicIding, as well as treatment of infected persons and animals, and large-scale disease control using drugs. During the subsequent 30 years, the control strategy has been continually modified in response to changing epidemiological and technological requirements.

Chemotherapy is now the primary means for controlling infection and disease. Treatment for S. *japonicum* is basically free of charge (except, in recent years, for hospital treatment of acute cases). Snail control has mainly been carried out in the course of agricultural work, e.g. reclaiming of wetlands, leveling of land, digging of new ditches and filling old ones, changing rice paddies into dry crops, and ploughing by machine, and afterwards compacting the earth and mollusciciding. The elimination of infected snails has complemented drug therapy, with the objective of achieving both transmission and disease control.

In addition, the following preventive and technical support activities have been undertaken:

• *Epidemiological surveillance.* By using stool examination, serological tests, and physical examination, the infected persons, number of advanced cases, and prevalence rate have been worked out. Cattle have also been examined parasitologically. Detailed records of stool examination and treatment, and maps showing the snail distribution in each endemic township have been painstakingly prepared manually. As a result, detailed data and maps for schistosomiasis prevalence in the whole country, endemic provinces, counties, and townships are available for program planning and monitoring purposes.

• *Scientific and operational research.* Scientific research has been organized and coordinated by the National Schistosomiasis Research Committee (now the Schistosomiasis Advisory Committee). Operational research activities have responded to evolving field requirements. In the 1970s, research on chemotherapeutic agents was given high priority. Praziquantel (developed earlier in Europe) was resynthesized in China in 1977 based on the available scientific literature; and experimental and clinical studies and large-scale factory production followed. The drug is now available in quantities large enough to treat all infected persons (though not all cattle).

• *Technical training.* Since 1956, a large number of scientists and physicians have been trained in the basics and techniques of schistosomiasis control. In-service and refresher training courses are frequently held at national and provincial levels, using professionals from universities and research institutes and senior program managers. This has ensured adequate numbers of qualified and well-trained staff.

• *Health education.* Knowledge about the life cycle of the parasite, disease transmission, and methods for disease prevention and treatment has been extensively disseminated through school education, slogans, posters, reading materials, exhibitions, lantern slides, films, etc. As a result, many people in endemic areas know about schistosomiasis and how its transmission can be controlled.

• *Mass mobilization.* In the early years of the program, active participation of the broad masses of the people was achieved in endemic areas. For example, for environmental modification — one of the principal measures used for snail control — tens of millions of people were mobilized through centrally-directed administrative and political channels. In more recent years other control measures such as chemotherapy, mollusciciding, sanitation, safe water supply, and personal protection have also generated community participation, though to varying degree.

Results achieved

In the 1940s, morbidity and mortality rates due to *S. japonicum* were relatively high in endemic areas in China. For example, in Jiashan county, Zhejiang Province, more than 17,000 people died of schistosomiasis during a 10-year period before 1949. In 1950 in Xinmim township (in Gaoyou county, Jiangsu province), during a flood season, 4,019 out of about 7,000 villagers acquired acute infection, and 1,335 died. Terms such as "village without villagers," "widows' villages," or "big-belly villages" graphically depicted the horrifying impact of the disease. In fear, many people deserted their villages and large areas of cultivated land to move to distant areas free of the infection. However, since the launching of the control program in 1956, schistosomiasis prevalence has been drastically reduced in China, primarily due to the extraordinary priority given and efforts put into program design and implementation.

The outstanding results achieved over the past 30 years are apparent from Table 2.1 (overleaf).

In 1988, among the 373 counties and cities formerly endemic for *S.japonicum*, 122 had declared

that the disease had been eradicated, and 141 counties had it under effective control.[1] In 1985, Shanghai municipality (with nine formerly endemic counties) and Guangdong province (with 11 endemic counties) declared eradication of schistosomiasis; Fujian province (with 13 endemic counties), and Guangxi province did so in 1986 and 1989 respectively. Zhejiang province is also approaching the criteria of eradication. In 1989, the figures were: of the 378 counties and cities formerly endemic, in 149 schistosomiasis had been eradicated, 111 were under effective control, and 118 were still endemic (some changes in numbers were due to changes in administrative boundaries). At present, the major endemic areas are in the swamp, lake, and mountainous regions — mostly in the five provinces surrounding the Poyang Lake (the largest in China), the Dongting Lake, and along the Yangtze River. In these areas, control efforts are continuing, but much still needs to be done, as discussed later.

Table 2.1 Results achieved in schistosomiasis control, 1956-87

Indicator	Prevalence 1956	Prevalence 1987	Reduction (percent)
Number of endemic provinces and autonomous regions	12	9	25
Number of endemic counties	373.0	107.0[a]	71
Population at risk (in millions)	100.0	50.0[b]	50
Infected persons (in millions)	10.0	0.9	91
Infected cattle (in millions)	1.2	0.1	92
Snail habitats (in billion m²)	14.5	3.2	78

a. 141 counties had low level of prevalence.
b. WHO estimate.

Program organization

Health sector organization

The organizational structure of health care delivery in China at the (national and) provincial level is schematically shown in Figure 2.1. Although there is substantial local variation, in general there are three main organizational "legs" upon which the service depends. These are: vertical preventive programs, clinic-based services, and birth planning services. Much of the preventive medicine in China is public, and is vertically organized, with responsibility for controlling specific communicable diseases centrally located. In addition, hygiene promotion (through the National Patriotic Health Campaign Committees) is undertaken in coordination with political authorities in a centrally-directed fashion. The vertical preventive programs heavily utilize the clinic-based services for their implementation, and would be far less effective without them. Nonetheless, the strong emphasis placed on categorical programs and health campaigns (except during the Cultural Revolution) has played an important role in China's success in dramatically reducing morbidity and mortality rates. This emphasis on centrally initiated and directed vertical programs — on a multi-disease basis, except for schistosomiasis and tuberculosis in highly endemic areas — is worth noting, especially for countries seeking to learn from China's experience of primary health care.

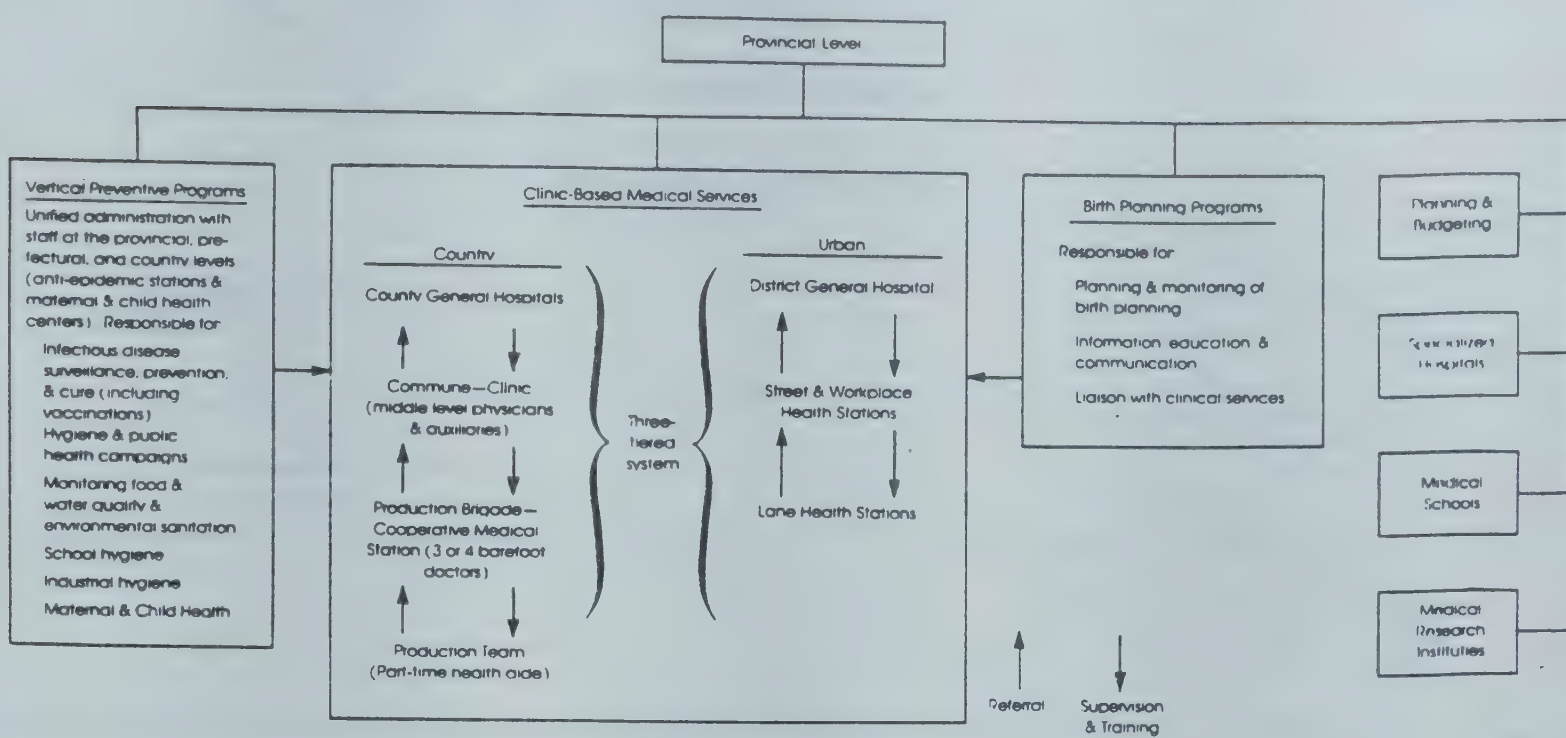
An organization chart of the national Ministry of Public Health (MOPH) is shown in Figure 2.2 (on page 24). The MOPH primarily has a legislative, regulatory, and oversight function, and does not have major responsibility for executive and service delivery functions. The administrative hierarchy of the MOPH extends from national to county levels; and the health bureau staff at each administrative level are small in number and primarily have a planning and coordinative role (especially in relation to the schistosomiasis control organization).

Schistosomiasis control organization

The schistosomiasis control organization also rests on three somewhat independent but related "legs" — the political, administrative, and technical structures (see Figure 2.3 on page 25). These three parallel but mutually supportive lines of authority and responsibility extend from the national to township levels; and each serves a distinct but complementary function. The inter-sectoral leading groups report to the political chain of command and provide policy direction; the health bureau staff report to the MOPH and oversee implementation; and the research institutes, anti-schistosomiasis stations, and anti-epidemic stations at various levels provide scientific leadership, undertake much of the schistosomiasis control activities, and provide the technical support services required for disease surveillance, preven-

1. See Annex 2 for the stringent criteria established in 1985 for declaring an area "eradicated" or "under effective control."

Figure 2.1 Organization of health and birth planning services



Source: World Bank data.

tion, and control.

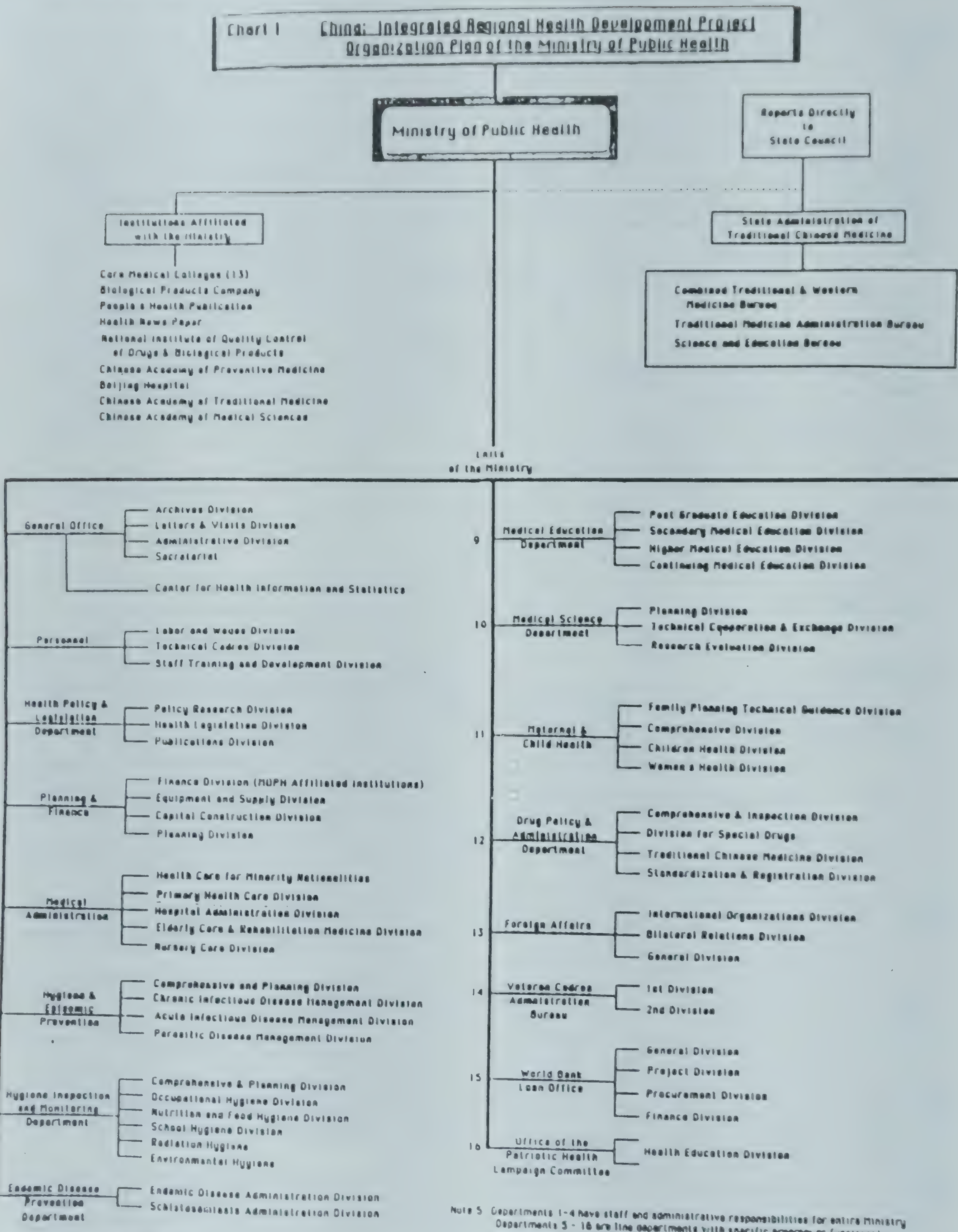
The schistosomiasis control organization is structured more on the basis of "professional levels" rather than strict administrative hierarchy, with a functional division of labor between the provincial and county-level institutes and stations rather than a bureaucratic reporting relationship (as discussed below).

When the National Leading Group for Schistosomiasis Control was functioning between 1956 and 1986, the minister or deputy minister of the MOPH was the group's deputy leader. The group leader was a member of the Political Bureau of the Central Committee of the Chinese Communist Party. The minister or deputy minister of the MOPH took care of the national control program through both the vertical line of schistosomiasis control and the provincial public health bureaus under the MOPH. After the dissolution of the National Leading Group and its office in 1986, the Bureau of Prevention and Treatment of Endemic Diseases, under the direct leadership of MOPH, has been responsible for national work of schistosomiasis control.

The bureau has four administrative departments or sections. They are for: (a) epidemic diseases (including plague and brucellosis); (b) endemic diseases (goiter and cretinism, Keshan disease, filariasis and Kashin-Bek disease); (c) schisto-somiasis; and (d) other (general) activities. Thus, there is a separate division for schistosomiasis control while the remaining diseases are grouped together. The main responsibilities of the bureau and its constituent departments and divisions are to:

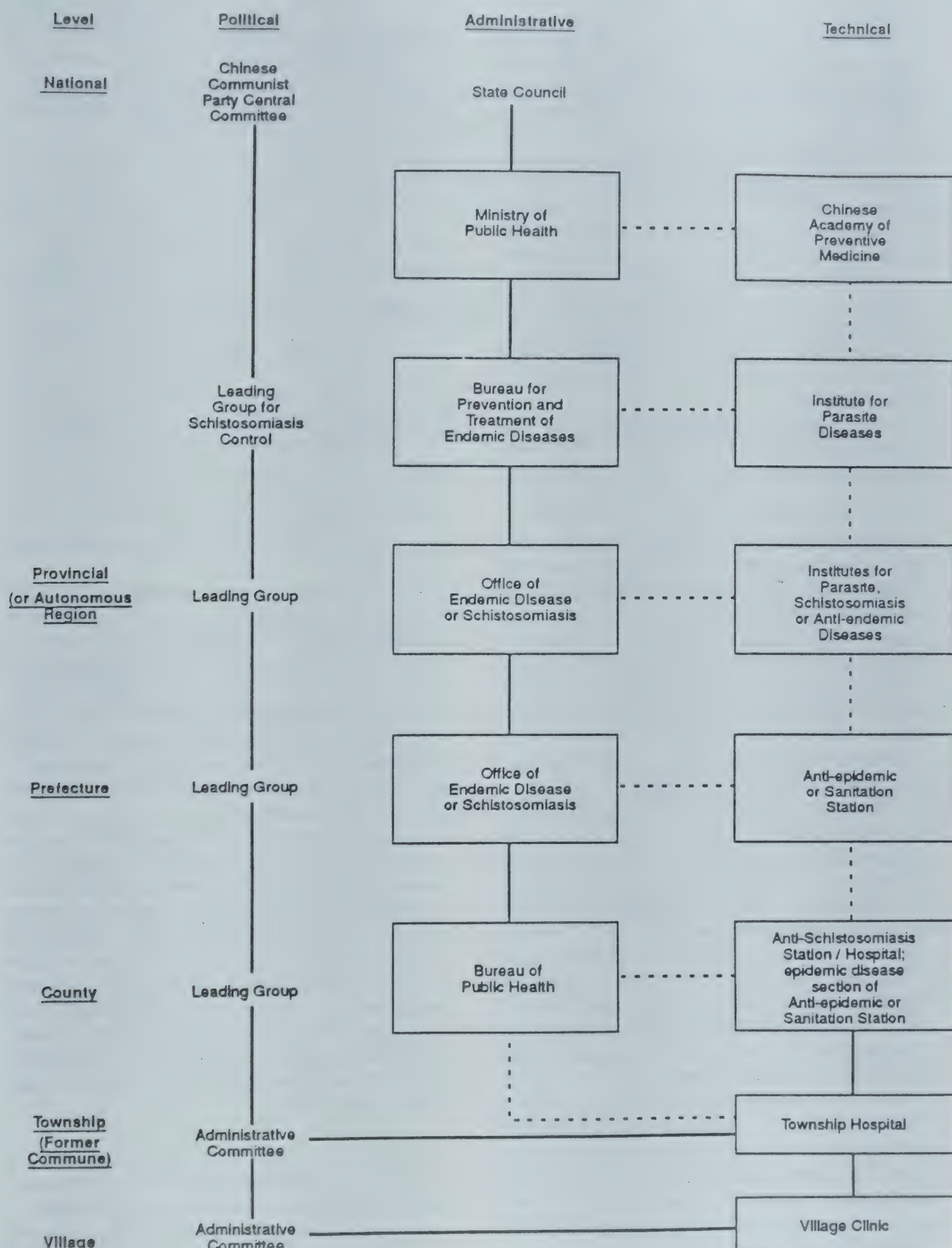
- Establish policies, regulations, schemes, and criteria for prevention and treatment of the diseases covered.
- Direct the professional work of institutions specializing in the diseases.
- Collect and analyze information about the epidemic situation of the diseases.
- Provide health-care education to the public.
- Manage the training of professional personnel in collaboration with related departments/bureaus.
- Administer research work on the diseases in conjunction with related departments/bureaus, and communicate research findings internationally.

Figure 2.2 Organization of the Ministry of Public Health



Source: World Bank data.

Figure 2.3 Organization of schistosomiasis control



• Undertake other miscellaneous activities associated with prevention and treatment of the diseases covered.

At the national level, the main scientific work for control of endemic diseases, including schistosomiasis, is done in three national research centers directly under the leadership of the central bureau. These centers respectively cover endemic diseases, leprosy, and venereal diseases. At the provincial level, the professional work of disease prevention and control is undertaken in roughly 60 provincial research centers, institutes, and stations under the leadership of the local health department. There are five specialized provincial institutes for schistosomiasis; but anti-schistosomiasis work is also undertaken in specialized departments and sections of provincial institutes of parasitic diseases and of anti-epidemic or sanitation stations.

These research institutes and anti-schistosomiasis stations and hospitals have been established at different levels. Of these, the National Institute of Parasitic Diseases in Shanghai (under the Chinese Academy of Preventive Medicine in Beijing) and a number of Provincial Institutes of Parasitic or Endemic Diseases have done outstanding work. The main responsibility of these research institutes is to: prevent and treat endemic diseases; direct lower-level professional units in research practice and technique; draw up technical regulations; train professional personnel; appraise scientific achievement; and set up and collaborate in a nationwide scientific network.

In the majority of provinces and autonomous regions, the local communist party committee or the local government has a leading group for prevention and treatment of endemic diseases. In addition, for some of the provinces endemic in schistosomiasis, there is a separate leading group for that disease. A corresponding office for endemic diseases or schistosomiasis, within the local health department, deals with routine administrative matters. Such an organizational arrangement exists in almost every administrative division and county. The areas endemic in schistosomiasis have full-time cadres responsible for administrative matters pertaining to that disease.

For example, at the county level in Jiangxi Province, each of the 35 counties heavily endemic in schistosomiasis has an anti-schistosomiasis station. The largest of these, in the Poyang Lake area, has 280 workers for schistosomiasis. The average anti-schistosomiasis station has about 100 specialized staff — compared with about 30 multi-purpose workers (excluding village health workers) in an average anti-epidemic station. In addition, there are more than 30 specialized anti-schistosomiasis hospitals at the county level. At the next lower (township, previously commune) level, each heavily endemic township has an anti-schistosomiasis team operating out of the local anti-epidemic or sanitation station.

The various types of arrangements at the provincial and lower levels are shown in Figure 2.4.

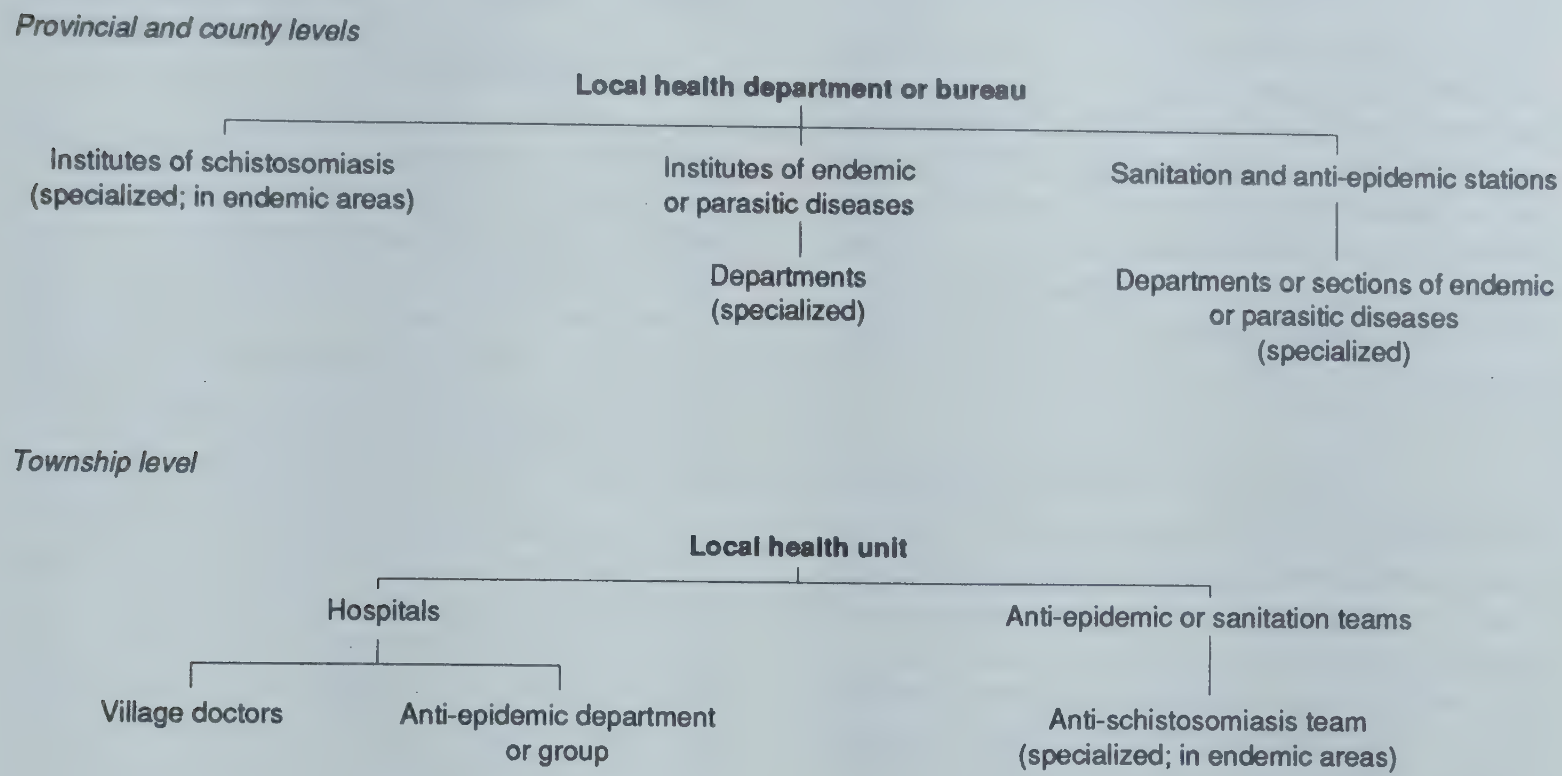
A total of about 14,000 professional staff (scientists, physicians, and public health workers) are directly engaged in schistosomiasis control at various levels. (The number was 16,000 in 1957.) The majority of these staff have intermediate-level qualifications and are trained as field technicians for schistosomiasis control operations. Although they are under the administrative control of the respective local health department or bureau, technical (functional) guidance and support are provided by the professional staff of the institutes, departments, or stations at the next higher level. This distinction between technical and administrative supervision reinforces — at all levels — the specialized character of the schistosomiasis control program.

Summarizing, the control program's objectives, policies, targets, funding, and staffing are determined by the various leading groups, while the scientific research and technical services are provided by the research institutes and anti-epidemic stations. The total number of scientists, physicians, and public health workers engaged mainly in schistosomiasis control and paid by government is about 14,000 excluding rural health workers paid by their collectives.

The administrative staff of the MOPH are responsible at national, provincial, district, and township levels for implementing the directives of the respective leading groups and for overseeing the work of various technical staff engaged in schistosomiasis control. Over 1,000 staff are thus engaged in administering schistosomiasis control activities in the public health departments and bureaus at various levels. (Central and provincial government funding of schistosomiasis control totaled about 700 million yuans, i.e., about US$148 million as of 1989.)[2]

2. Anonymous. "Schistosomiasis japonica" in G. Zheng, ed., *Experiences of Preventive Medicine in the People's Republic of China*, Vol. III. Beijing: People's Publishing House, pp. 239-85 (in Chinese).

Figure 2.4 Types of organizational arrangements at the provincial and lower levels



Program management

Planning and implementation

The organizational arrangements described above have facilitated the planning and implementation of China's schistosomiasis control program. At each administrative level, the MOPH's plans are directed and approved by the respective leading group for schistosomiasis control, and are implemented by the concerned research and professional staff of the various centers, institutes, stations, and sections or teams. To give an idea of how the planning and implementation is actually undertaken at different levels, examples are given below of the work of: (a) the National Leading Group (since 1986, the MOPH); (b) the National Bureau for Prevention and Treatment of Endemic Diseases, in Beijing; (c) the provincial authorities; (d) the National Institute of Parasitic Diseases, in Shanghai; (e) the Jiangxi Provincial Institute of Parasitic Diseases, in Nanchang; and (f) the anti-epidemic and anti-schistosomiasis stations in the Juijiang region of Jiangxi province.

THE NATIONAL LEADING GROUP. The program's governance structure at the national level is a key contributor to the success of the overall planning process. Each of its various aspects serves a vital function in ensuring program relevance and effectiveness: (a) the leading group's direct access to the Party's Central Committee gives political legitimacy to the program, and its inter-sectoral composition ensures a comprehensive national perspective; (b) the bureau's direct reporting relationship to the minister of public health strengthens the program's administrative clout and gives access to financial and other resources of the MOPH and other public agencies; (c) the advisory committee's objectivity and involvement ensures the technical soundness and feasibility of the program; and (d) the bureau's own full-time professional staff provide the needed follow-up and oversight of program implementation.

When the control program was launched in 1955, the National Leading Group for Schistosomiasis Control called for a vigorous campaign to eliminate schistosomiasis—wherever technically possible — in seven to 12 years. Although this goal proved to be overly ambitious, it did inspire the Chinese people to go all out in their control efforts. Millions of people were mobilized to do snail surveys and elimination work, and numerous health workers were engaged in case identification and treatment. For case detection, a large quantity of antigen for *S. japonicum* was urgently required, and the National Institute of Parasitic Diseases provided adult worm antigen and liver egg antigen within a few months for conducting intradermal tests on almost 60 million

people in endemic areas.

In later years, it became apparent that — despite substantial reductions in prevalence, intensity, and distribution of schistosomiasis — the original goal was unachievable, and that "elimination" was a long-term, complicated, and arduous task. The National Leading Group acknowledged that program targets and deadlines had to vary by province and county, depending on local circumstances, and that in some areas — such as the lake regions — control of schistosomiasis would be especially difficult.

THE NATIONAL BUREAU. At the national level, the bureau is responsible for the program's long-term strategy, medium-term plan, and annual budget. These are determined on the basis of technical recommendations of the Advisory Committee for Schistosomiasis Control; and are approved by the inter-sectoral Leading Group for Schistosomiasis Control at its annual meeting. The approved policies, goals, and targets then become the basis for more-detailed operational planning at the provincial and lower levels. Rules and regulations are formulated for endemic disease control, including schistosomiasis, in accordance with the national health policy. For supervising implementation of the control program, officials from the bureau frequently go to provincial, county, and even township levels. During field visits, they help local officers and professional staff to synthesize their experiences and to resolve the problems encountered. Special funds are frequently provided by the bureau to meet urgent demands of the control program in some endemic areas.

Administrative and professional meetings for schistosomiasis control and research are also held regularly by the bureau. National-level workshops and training courses for anti-schistosomiasis professionals from endemic provinces are also provided by the bureau, in cooperation with a medical university or institute of parasitic diseases. (The courses usually include intensive English language training.) Data processing is another essential service provided. Data are collected from different endemic provinces, and are distributed, after compilation, to provincial-level bureaus, offices, and institutes related to schistosomiasis control. As a result, soon after data collection, the schistosomiasis epidemic situation is reported to the MOPH and to health authorities in each endemic area, up to the provincial level. The reports include areas of snail habitats, prevalence rates, numbers of infected persons, acute infection, and advanced cases, as well as progress in snail elimination, and disease identification and treatment, in the previous year.

PROVINCIAL AUTHORITIES. Based on the past 30 years' experience, the National Bureau fully realizes that control of schistosomiasis is a very hard task and it allows the control target and objectives, both medium- and long-term, to be decided by the authorities of each endemic province. Each provincial authority determines its program in light of the local situation, its social development and available resources, especially funds. In developing the control program, the responsible provincial officers set up objectives county by county after discussion with local officials.

In doing this, inter-sectoral cooperation is emphasized because the health sector cannot reach its schistosomiasis control targets without support from the bureaus of agriculture, forestry, water supply, water conservation, chemical industry, finance, etc., and other units such as the army. This coordination can only be achieved through concerted efforts by a powerful provincial official, such as a provincial governor or his deputy; the director of the health bureau does not have the needed authority. So in all heavily endemic provinces, provincial leading groups for schistosomiasis control, with one of the provincial government leaders as their group leader, have been in existence since 1956. Recently, the central State Council has considered setting up a new Leading Group for Schistosomiasis Control in five provinces of the lake region, with the national Bureau of Prevention and Treatment of Endemic Diseases taking responsibility for supervising day-to-day tasks.

THE NATIONAL INSTITUTE OF PARASITIC DISEASES. In determining national and provincial programs, the scientific excellence of the control strategy and its technical and administrative feasibility are of major concern. The national bureau in Shanghai receives assistance from the Institute of Parasitic Diseases — which is the lead research center for schistosomiasis and other parasitic diseases. This institute, with a total of 329 staff members, has 99 professional staff engaged in scientific research on schistosomiasis control methods and endemic conditions, and collaborates with several provincial institutes in field testing new methodologies and techniques. It also undertakes epidemiological surveys in endemic areas, trains program staff

and provides technical advice.

In accordance with the health policy of China, the institute undertakes the following tasks:

- Research on the technical problems confronted in the control of important parasitic diseases and their relevant theoretical studies.
- Planning of collaboration on specific topics, and organization and coordination of national research program on major parasitic diseases (proposed).
- Technical training and guidance of professionals from provincial institutions.
- Studies on sanitary regulations, standardization, and technical policies.
- Collection and dissemination of scientific information on parasitic diseases.

About 50 percent of the research and technical staff of the institute are actively involved in study of schistosomiasis. Senior scientists have been frequently consulted on the strategy and technology for schistosomiasis control by policymakers at the national level (i.e. by members of the National Leading Group and its Office for Schistosomiasis Control, now the Bureau of Prevention and Treatment of Endemic Diseases, MOPH).

THE JIANGXI PROVINCIAL INSTITUTE. After the general policy has been set, detailed operational planning and implementation is done at the provincial, prefectural, county, and township levels by the various institutes and stations. Specialized staff engaged primarily in schistosomiasis control are responsible for all but strictly administrative aspects of the program. The Jiangxi Provincial Institute of Parasitic Diseases, for example, has responsibility for about 2.5 million people at risk, in 35 counties and cities. The budget for schistosomiasis control in Jiangxi Province was 5.9 million yuan (about US$1.25 million) in 1989. The institute, located in Nanchang, has a much more limited budget, roughly half of which goes for salaries to 72 scientific and technological staff, including 56 doctors. The institute has several departments (of epidemiology, diagnosis, treatment, etc.), a clinic with 30 beds for schistosomiasis patients, and a pilot snail-control station with the necessary laboratory facilities, equipment, transportation, etc.

Since 1958, the Jiangxi Provincial Institute has done a lot of work on schistosomiasis control, including scientific research, training in epidemiology, and provision of technical and advisory services to city health bureaus and county anti-schistosomiasis stations. Operational research has focused on control measures and strategy for the lake and swamp areas, snail ecology, and diagnostic methods of immunology. Since 1984, a series of new technologies has been introduced in collaboration with various national and provincial institutes. The institute's team of six to nine extension workers has helped local health workers adapt and apply these new technologies to field conditions, resulting in transmission control in 17 townships. To facilitate this field work, detailed maps have been prepared, both for infected humans and snails, and the distribution of infection has been tracked over time and geographical areas. Institute staff have also helped anti-epidemic stations prepare schistosomiasis control projects, conduct investigations, and provide advice to affected communities.

Taking the local situation into consideration, the institute prepares schistosomiasis control programs for one-year, three-year and five-year periods for the whole province after discussion with administrative and professional personnel from the endemic counties. The program is subject to ratification by the provincial health authority and the provincial Leading Group for Schistosomiasis Control. Revisions are made during implementation. In the process of implementation, financial constraints are usually encountered, which forces the provincial or county health authorities to change their plan of action if they cannot get funds from other sources. Bad weather is another unfavorable factor for the control program. In years of heavy rainfall, the water level is higher than usual and human water contact becomes more frequent. As a result, the incidence of acute and new infections goes up sharply and snail habitats are extended. Limited funds which would otherwise go to different intervention approaches have to be used to treat a larger number of acute and newly infected cases.

The planning horizon at the provincial and prefectural or city levels is up to five years, with progressively more detailed planning being done for the immediate future and for specific field activities, especially if these are part of a larger project. For example, the Jiangxi Provincial Institute and the Anti-Schistosomiasis Institute in Juijiang city — both of which are involved in implementing a recently approved World Bank-funded health project — have prepared work plans for three time periods (1989, 1990, and 1989-93) so that control program activities could be implemented and monitored systematically.

Included in these plans are specific objectives

and targets for each of three areas: personnel training and coaching; technical assistance and consulting services; and investigation of endemic areas. In the next five years, the Provincial Institute plans to: conduct several in-service training courses of one month duration on different technical topics; supply intradermal test antigens for detecting infection; assist county level staff in reducing snail infection in endemic areas; and undertake a number of operational research activities jointly with the staff of various anti-schistosomiasis and anti-epidemic stations.

ANTI-SCHISTOSOMIASIS AND ANTI-EPIDEMIC STATIONS. In all these activities, although the work is done collaboratively with staff of various public health bureaus, anti-epidemic stations and sanitation stations, the main responsibility for planning and implementing the control program rests with staff and institutions "specialized" in schistosomiasis prevention and control — such as the anti-schistosomiasis stations. The staff of the anti-schistosomiasis stations and hospitals are engaged in schistosomiasis control activities on a full-time basis.

In areas where there is no anti-schistosomiasis station, the work is handled by the city or county anti-epidemic station. These stations have professional staff (including physicians and intermediate-level technicians) working in several departments (of epidemiology, immunization, endemic diseases, health education, food hygiene, environmental and school health, occupational health, disease surveillance, central laboratory, logistics, and administration). Of these, professional staff working in the departments of immunization, surveillance, epidemiology, and endemic diseases undertake schistosomiasis control activities, as needed. Although these staff are under the administrative authority of the station director, they have a separate budget for schistosomiasis for which they are functionally responsible to the provincial health bureau and parasitic disease institute.

These various activities and organizations form a cohesive network of specialized institutions. Equally importantly, in a very real sense, the 14,000 professional staff engaged in schistosomiasis control — from the national to township levels — constitute a specialized cadre of health workers in China. Because the outstanding contribution of these personnel is a key reason for the success of the schistosomiasis control program, management of human resources is discussed separately below.

Human resource management

In terms of formal procedures for personnel management — for such aspects as recruitment, promotion, salary administration, incentives, etc., — the 14,000 specialized staff of the schistosomiasis control program are treated no differently from the rest of the public health service. Despite this, over the past 35 years or so, a remarkable *esprit-de-corps* has developed, fueled by the professional dedication and commitment of the senior program staff — many of whom have devoted their entire careers to the program. Various aspects of how the schistosomiasis control program's human resources are managed are outlined below.

In terms of recruitment policies and practices, program staff are hired as regular employees of the respective public health service at the national and provincial levels. Upon selection for government service by a centralized recruitment office, staff are allotted to the various health departments and programs according to need. The employees' preferences are not a major consideration (at least formally). In view of the government's high priority for schistosomiasis, obtaining the required numbers of staff has generally not been a problem for the control program. However, because the work is known to be hard — both in terms of the routine involved (especially for snail control) and its location (in remote, rural areas) — only a small proportion of recruits are enthusiastic about joining the program. Despite this, senior program managers are not at liberty to offer terms of employment that could overcome the initial reluctance of their new colleagues.

The program's scheme of service — salaries, grades of pay, benefits, incentives, etc., — are also governed by standard civil service regulations over which program managers have little control. However, the Government is the major employer of medical graduates and technicians in China, and there is little possibility of getting a substantially better remuneration package in other employment (with state enterprises or collectives, for instance). Job security is highly valued, transfers and turnover — both voluntary and involuntary — are low. The result is a rather stable work force that expects to serve long years under normal conditions of government employment.

The lack of managerial discretion over person-

nel issues extends to such other aspects as performance evaluation, promotion, rewards and sanctions, etc. The policies and procedures required to be used are standard throughout the public health service—with no special provision for specialized services such as the schistosomiasis control program. Scientists and professional staff expect to slowly move up the hierarchy to senior positions as heads of technical activities or departments. Some of these positions provide status and salary equal to or better than that of administrators of provincial or national health bureaus. However, the differences are marginal — both between senior technical and administrative positions, and among the various provincial health services — and do not appear to constitute major irritants or incentives for the outstanding performer.

Although the government's civil service regulations do not provide great latitude for innovative personnel management, managers and staff of the schistosomiasis control program have shown a remarkable dedication to program objectives and tasks. Several factors have helped generate and sustain this commitment:

• Since 1956, the Government has consistently accorded high priority to controlling schistosomiasis, and has used its considerable political and administrative powers to support program activities and to mobilize program staff and the general public.

• In the early 1950s, there was no question that the program was urgently needed to alleviate the suffering of large numbers of people; and the program's technical staff accepted the challenge of making a significant contribution to an important area of public health.

• Program results are measurable in quantitative terms, the criteria for "success" are well established (see the Annex), and the performance data are regularly reported by county and province to higher authorities. This enables the high achievers to get personal satisfaction as well as public recognition for a job well done. In addition, the system for program planning, implementation, and monitoring is quite thorough and results- oriented, and this ensures a certain amount of functional accountability throughout the specialized schistosomiasis control organization.

• The professional staff have been given considerable flexibility in designing and implementing the program, and take seriously their responsibility for producing results. The creation of this "professional organization" is perhaps one of the key factors underlying program success. The internal organizational culture is one of mutual support and collegiality. All the senior professional staff have been around for 20 to 30 years, know each other personally, regularly attend various committee meetings in headquarters and in the provinces, and share a practical approach to solving problems in the field.

• A key facet of this professional approach is that although schistosomiasis control is not a high-status activity, the senior staff have set an example of commitment to public service. This tradition, due in part to the post-1949 revolutionary zeal, could gradually change as new societal values and norms get established. However, efforts are being made in several provinces to maintain the service orientation and to publicly recognize the contribution of experienced employees. This is being done by giving awards to those with 30 or more years' service, and in some provinces and counties by establishing a photographic record of accomplishments over the years.

• Reinforcing this public service orientation is a concerted effort in-service training. A large number of technical training courses are organized at provincial and national research institutes. The duration of training varies by topic, audience, and purpose. Short-term courses are for a few days to a few weeks, while long-term training (usually at a medical college or at the Institute of Parasitic Diseases in Shanghai) lasts from six months to one year. Although most of this training is technical in nature, station management issues are also occasionally discussed. Certificates of completion are awarded to all participants. The faculty are drawn from universities, research institutes, and from among experienced program staff. High-level workshops involve senior managers and professional staff from around the country, and are led by recognized national experts, sometimes supplemented by specialists from international agencies such as WHO.

Thus, a combination of factors — such as non-financial incentives; recognition of professional competence; authority commensurate with responsibility; systematic work planning and control; a tradition and culture of public service; training; and governmental pressure for results in a high- priority area — has been instrumental in generating superior performance from program staff, despite their normal civil service status and salaries. Supplementing these factors is a strong emphasis on field operations. This latter aspect is

also enormously important in the schistosomiasis control program in China and is discussed below.

Managing field operations

The success of China's schistosomiasis control program is ultimately based on what is achieved in scores of villages and townships by hundreds of field workers, supervisors, and township leaders. Although field-level performance varies by province and county, as should be expected, in general the system has functioned very well. Program staff seem to have managed, in a coherent fashion, the many factors involved — political, organizational, technological, managerial, and community-related. Even though recent financial constraints and policy changes have begun to weaken field activities, the basic operational capability built during the 1960s and 1970s remains in place.

A village-level example of this capability and approach is provided by Ai-Guo village, of Yong An township (in Juijiang region, Jiangxi province, southern China). In the early 1950s, the village and surrounding areas were highly endemic in schistosomiasis. Acute infection was common — the prevalence rate was 38 percent, and the density of *oncomelania* snails was as high as 300 per square foot. Of the 1,035 schistosomiasis patients in Ai-Guo and the adjoining villages, at least 40 died of the disease. The infected snail habitat — mostly swampy areas thick with weeds, and covering more than 1.3 million square meters — was in the midst of the agricultural land upon which the entire village population depended.

By the late 1960s, the local authorities had established an effective control program. An epidemiological survey mounted by the provincial and city health authorities (i.e. the local health bureau and anti-epidemic station, under the guidance of the provincial institute) had provided a detailed map of the distribution of infected people and snails; and the local village authorities had mobilized more than 1,000 volunteers to build new irrigation ditches and to bury the old ones. Environmental modification — primarily the manual digging of a 5-kilometer-long ditch, 15 meters wide and 3.5 meters deep, and compacting of the infested soil — had helped convert the endemic paddy fields into dry land largely free from infected snails.

In terms of organizational arrangements, staff of the anti-epidemic station flexibly implemented the prescribed procedures, under the guidance of the schistosomiasis leading group and the village administrative committee. Village-level health workers helped undertake field activities. These workers had been trained by township-level program staff on the proper techniques of vector control and in the provision of drugs. The testing of stools, snails, humans, and cattle for their infectivity was done at the nearest anti-schistosomiasis station, using resources (staff, equipment, transport, and supplies) of the township health unit. Drugs for treating people and cattle were provided free of charge. The entire field-level operation was given technical support by the provincial institute of parasitic diseases through regular field visits that combined functional supervision with on-the-job technical training.

In the Ai-Guo area, much of this control effort was completed by the mid-1970s. Since 1974, no new cases of severe infection have been found, and infected snails have been eliminated. A thorough epidemiological survey in 1978 established that the area met the criteria of "effective control"; and by 1984 the area had met the criteria of "eradication" (see the Annex). Surveillance activities have continued since then, with sample snail surveys and stool examinations of previously infected persons being conducted every spring and autumn by staff of the township anti-schistosomiasis station. Besides this serological follow-up of earlier patients, seven- to 15-year-old school children are regularly tested for possible infection. County-level anti-schistosomiasis program staff double-check these test results. In addition, provincial and township health education campaigns — using radio broadcasts, slogans, posters, and a nationally-prepared film — supplement the ongoing classroom education on measures for schistosomiasis prevention and control. The result is effective surveillance and prevention of the disease in an area that has achieved virtually complete success in schistosomiasis control.

The progress achieved in Ai-Guo village is, of course, not necessarily typical. Many villages and counties remain endemic, to varying degree, while many others are gradually moving toward effective control or eradication or have only recently achieved such status. However, the organizational arrangements and management processes that have facilitated success in Ai-Guo are similar to those used elsewhere, and provide a representative illustration of how the schistosomiasis control program operates in the field.

Another village-level example of control of schistosomiasis is Shangzhang village in a hilly region of Fuqing county, Fujian province. According to an investigation in 1956, the village, with a population of 1,642, was highly endemic for schistosomiasis. The prevalence rates in man and cattle were 66.4 percent and 38.4 percent respectively. The *oncomelania* snail habitats totaled 121,903 square meters and infected snails accounted for 3 percent of all snails — 134 out of 137 (97.8 percent) irrigation ditches were infested with the snails. The villagers lived and worked in an area surrounded with the vector snails.

In recognition of this serious situation, an anti-schistosomiasis team was established. Control activities were financially supported by the government and technically guided by the county anti-schistosomiasis station as well as the Provincial Institute of Parasite Diseases.

During the ensuing 20 years, a total of 1,330 infected persons were identified and treated, as were 91 infected cattle. Snail habitats were discovered and treated repeatedly, using environmental modification and mollusciciding. Health education, and safe-water supply and toilet construction, were also carried out. A sum of 45,680 yuans was spent on control work, of which 52.9 percent was for snail survey and elimination; 25.5 percent for safe-water supply and sanitation; and 20.1 percent and 1.4 percent respectively for diagnosis/treatment of infected persons and infected cattle. The above-mentioned expenses did not include salary of the team members. In 1975, after intensive intervention, the village virtually reached the criteria of eradication (these criteria were formalized 1985). No new infection has been found after 1975, both in man and in domestic and wild animals. Subsequently, *oncomelania* snails have not been found for eight consecutive years; and transmission has thus been interrupted.[3]

Qingpu county of the Shanghai municipality is an excellent example of schistosomiasis control at the county level. This county, located to the west of Shanghai city, is one of the 10 most heavily endemic counties for schistosomiasis in China. It had a population of 389,457 in 1985. Twenty-three of 25 townships in this county had snail habitats, and a cumulative area of 74 million square meters of the habitats had been discovered between 1950 and 1983. The cumulative numbers of infected persons and cattle were 157,232 and 3,779 respectively.

As the county is located in the plains region with abundant water networks, almost every ditch and river had snails. Snail control required painstaking effort. By 1983, 6.77 million man-days had been spent on snail survey and elimination, primarily environmental modification and mollusciciding. The county finally eliminated the snails in 1983. A notice was put up and broadcast by the county government in 1984 saying that anyone who could find live *oncomelania* snails in Qingpu would be awarded 10 yuans per snail. People were mobilized to find the snails, including the rural health workers who had experience in snail survey. No one got any award; the infected snails had been completely eradicated.

For chemotherapy, 401,067 man-courses (a considerable proportion of the infected subjects were treated more than once) of anti-schistosomiasis treatment were recorded. Among the patients treated, a total of 5,657 advanced cases of schistosomiasis with splenomegaly had their spleens removed through surgical operations. Tens of thousands of residents of Shanghai city, in addition to those living in the endemic areas, were mobilized to assist in the snail elimination effort. Several hundred professional medical and health workers from the municipality were dispatched by the government to help the local health workers for identification and treatment of the infected persons, including surgical intervention. Snail elimination and chemotherapy were the major intervention approaches for both transmission and disease control. Other control approaches included sanitation and safe-water supply. Health education also played a very important role in the control process. In 1983, the county reached the criteria of eradication for schistosomiasis.[4]

Another example is Fujian province, which is mainly a hilly region with 67 cities and counties. Of these, 13 coastal counties were endemic for schistosomiasis. A total of 27.2 million square meters of snail habitats and 68,649 schistosome-infected persons and 5,647 infected cattle were recorded in this province. In the hilly areas, snails

3. G.Z. Chen and others, "A 30-Year Longitudinal Analysis for Schistosomiasis Eradication in Schangzhang Village, Fuqing County, Fujian Province," in G. Zhen, ed., *Progress in Epidemiology of Schistosomiasis in China 1980-85* (Jiangsu Medical Journal, 1989) pp. 170-5 (in Chinese).

4. Y.X. Shen, ed., *Thirty-Five Year Work for Schistosomiasis Control in Quingpu* (Shainghai: Publication House for Sciences and Technology, 1988) (in Chinese).

are usually distributed along waterways, as they need moisture. Isolated habitats were often confined to the middle and base of the mountains. The main snail habitats were in the plains and basins which are densely populated, and humans and cattle can easily be infected.

The control approach consisted mainly of:

• Eradication of the source of the infection by treating all infected persons and cattle whenever they were identified so as to control morbidity, to prevent economic loss, and to reduce aggravation and spread of endemicity.

• Elimination of snails at the middle and base of the mountains or hills, to prevent the disease from spreading to the plains and basins, especially to inhabited villages and cultivated fields. At the same time, to control the sources of snail habitats, snail ridden areas in the plains and basins were also wiped out through environmental changes and use of molluscicides. After 30 years of hard work, the whole province reached the criteria of eradication in 1986.[5]

Future expectations

Recent developments

Although schistosomiasis has been virtually or essentially eradicated from four provinces and 273 counties, the prevalence rate of infection and morbidity is now beginning to go up in some areas, mainly the swamp, lake, and mountainous regions. Since 1985-86, funding constraints and policy changes at the national level have begun to adversely affect program coverage and performance. The government's insistence that all sectors and programs — including such "public goods" activities as endemic disease control — take responsibility for earning part of their funding is distorting program priorities. The impact of this policy is most pronounced at the field-level anti-epidemic stations that have become overly dependent on user-fees for meeting basic operational costs (particularly for diseases such as tuberculosis and malaria).

In the case of schistosomiasis, the control technology used is directly affected by the resources available. Because transmission control activities (such as molluscicding and environmental control), and preventive activities (such as health education and epidemiological surveillance) do not generate revenues, they are being de-emphasized. Instead, there is pressure to generate income by providing hospital-based treatment for those who can pay — mainly civil servants or other workers covered by insurance programs. There is less incentive to undertake surveillance or preventive activities. This dysfunctional behavior is being exacerbated by the overall shortfall in government funding for operational activities, and could lead to a reversal of the program momentum and success so painstakingly achieved over the past three decades.

While the success achieved in schistosomiasis control is impressive, many challenges remain. Although about one-third of the endemic counties have reached the criteria of eradication and more than one-third of the endemic counties are under effective control, these areas were comparatively easier to control. The control of schistosomiasis in the remaining endemic counties will be an arduous and long-term task. Due to ongoing changes in the socioeconomic situation and in the household production-responsibility system in rural areas, people in endemic areas now work individually and are not as well organized as before. Control approaches such as molluscicding, stool examination of the endemic population, and even treatment of those infected, are increasingly encountering difficulties. Large-scale environmental modification, which had proven to be a useful approach for eliminating snails, is now quite hard to practice for fear of its impact on water conservation and the ecological equilibrium.

There is increasing silt deposit in rivers to form islets, and expansion of river banks on which weeds can grow, placing the human population at high risk of infection. Another major problem is the mountainous regions, mainly in Sichuan and Yuannan provinces. These areas have extensive snail habitats, are socioeconomically underdeveloped, and are difficult to reach. Furthermore, as schistosomiasis control needs large sums of money and repeated efforts, shortage of funds is a major problem in all endemic areas.

Future requirements

The program's impressive record, particularly the decrease in disease prevalence by more than 90 percent, was the result of several factors. The main reasons for sustained program performance include the following:

• Government and political commitment at the highest level.

5. G.Z. Chen, "Schistosomiasis Control in Hilly Regions of Fujian Province," *Chinese Medical Journal* 99 (1986):311-6.

• Inter-sectoral cooperation through political committees at all administrative levels — central, provincial, and county or township.

• 14,000-strong professional cadre of experienced, dedicated, and well-trained staff.

• Competent technical backstopping and guidance by specialized national and provincial research institutions and stations.

• Effective community mobilization for large-scale environmental modification.

• An effective health education program.

• A well-managed and reasonably efficient delivery system for individual case finding and treatment with chemotherapy (praziquantel).

While the major strengths and potential of the schistosomiasis program organization and staff are still essentially intact — and could be rapidly mobilized to counter the increasing incidence of schistosomiasis in the heavily endemic areas of the five provinces in the lake region — there is a possibility that shortfalls in governmental resources and the existing institutional "incentives" could seriously compromise the continued success of the control program.

Recognizing some of these dangers, senior government and party officials have in recent months encouraged the schistosomiasis staff in MOPH to reassess present and future needs, and propose corrective action. Provincial-level program managers of five provinces in the Lake Region have jointly prepared a draft program to revitalize schistosomiasis control for the five-year period 1990-95, along with a more detailed program of action for 1990. These plans have been endorsed by the professional, administrative, and political leadership at the provincial level, and have been forwarded to the national MOPH for consideration. In response, the minister and vice-minister of public health are personally heading two review teams, which after field visits in November 1989 are expected to submit their recommendations to government. A final decision on program size, scope, content, and funding was expected by early 1990.

Anticipating a renewed emphasis on the schistosomiasis control program, particularly in the five provinces of the lake region, the MOPH's Division of Schistosomiasis Control at the national level, the program staff of the Jiangxi Provincial Institute of Parasitic Diseases, and the relevant Juijiang health bureau officials discussed their plans and requirements with senior government and World Bank officials in late 1989. Subsequently, senior officials of the MOPH have officially inquired about possible World Bank assistance for the Government's five-year plan for controlling schistosomiasis in the heavily endemic areas.[6]

Concluding remarks

China still confronts the hard and long-term task of consolidating the success achieved, maintaining effective control, and bringing the still-endemic lake regions and mountainous regions under control. However, both the authorities concerned and professional staff are determined to maintain the fight against schistosomiasis because they are convinced that the disease would eventually come back if people became satisfied with an incomplete victory.

The national authorities responsible for schistosomiasis control in China recognize the need for continued long-term commitment and are now encouraging both technical and financial cooperation from international agencies, such as the World Bank, WHO, UNICEF, and nongovernmental agencies so as to accelerate the program for the control and eradication of schistosomiasis in China.

Annex Criteria for determining success of control efforts

Since 1985, the following criteria have been used for declaring that schistosomiasis has been "eradicated" or is "under effective control" in an area (township, county, province, etc.):

Criteria for eradication

• No new cases of *S. japonicum* infection either in man or in animals discovered for three successive years.

• The prevalence rate in a community examined by the stool hatching technique, performed on three consecutive specimens for each person tested, should be less than 0.2 percent in the population, with a coverage of at least 95 percent.

• All the patients without contraindications for medical treatment should be treated and all the

6. A World Bank-funded project, covering eight provinces in China still endemic with schistosomiasis, has been prepared and appraised in 1990-91. Project implementation is expected to start in early 1992.

infected domestic animals be cured or disposed of.

• No *oncomelania* snails should be found after careful surveys in spring and autumn for at least one year.

Criteria for effective control

• 90 percent of *S. japonicum* infected individuals should be cured and 90 percent of the infected domestic animals should be cured or disposed of, while most of the advanced and complicated cases without contraindications for treatment should not be excreting eggs.

• Living *oncomelania* snail colonies should not be found in 98 percent of the former infected areas while residual snail colonies should be present only in spotted distribution.

• Data concerning treatment drugs and courses, stool examination records before and after treatment, and maps showing the distribution of the snails before and after the control program in each township should be available.

3

Egypt: Schistosomiasis control

Introduction

The schistosomiasis control program in Egypt is one of the largest in the world; and the disease is the most important parasitic infection in Egypt. Snail control operations protect 18 million people living in 12 governorates, and cost less than 20 U.S. cents per person per year. Seventy-two towns and 1,800 villages are involved. The program controls *schistosoma haematobium* in Upper and Middle Egypt and *schistosoma mansoni* in Middle Egypt, and some areas in the Nile Delta. The program started with the objective of transmission control, and is now in the process of shifting toward morbidity control.

The program has been successful in reducing schistosomiasis prevalence from about 29.4 percent to about 10 percent in Middle Egypt and, more importantly, in reducing the intensity of infection by about 40 percent. In 1977 in Middle Egypt, positive examinations were 29.4 percent out of over 2.7 million persons examined. By 1988, this had been reduced to 8.6 percent. In Upper Egypt in 1980, positive examinations were 21.7 percent of about 775,000 persons examined. By 1988, this had dropped to 14.4 percent of over 3 million persons examined.

Disease incidence

Water, schistosomiasis, and development are inter-related in Egypt, as in other countries. Snails carrying the disease live and breed in water. The main watercourses and canals stretch for 170,000 kilometers, and subsidiary waterways are 500,000 kilometers long. The waterways are spread over more than 3 million acres. More than 95 percent of Egypt's population of 20 million lives close to the Nile on less than 4.5 percent of the total land area. There is urination and defecation in water near settlements and plots of land. Men enter the water not only for bodily functions but also with livestock and draught animals; women spend extensive periods of time in the water washing clothes and getting water for cooking; children swim in the waterways and canals during the hot summer.

Development initiatives involving reclamation of arid lands for agriculture, and the construction of an extensive network of irrigation and drainage canals has increased the people's contact with

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Note: This case study was prepared by D. Glynn Cochrane and Bernhard H. Liese, the World Bank, based on a mission to Egypt in 1989. It was revised by Paramjit S. Sachdeva, the World Bank. The study draws upon a background paper by Drs. Almotaz B. Mobarak and Saleh M. El-Hak, an evaluation of the Egyption program by the Royal Society of Tropical Medicine and Hygiene (Vol. 81, Supplement, 1987), and a forthcoming publication by G. Webbe and Saleh M. El-Hak. Secretarial assistance provided by Carol Knorr and Jeffry Pickett, the World Bank; and funding by the Edna McConnell Clark Foundation (grant number 04687) and the World Bank are gratefully acknowledged. The views expressed herein do not necessarily represent the official position of the World Bank, the Clark Foundation, or Egyptian Government officials.

water. With the completion of the Aswan High Dam in the late 1950s, and the introduction of perennial agriculture in 1964, the increase in irrigated lands brought about an increased threat of exposure to schistosomiasis. One village in the Assiut governorate in Upper Egypt, for example, was surveyed before and after the introduction of perennial irrigation; schistosomiasis prevalence had jumped from 6 percent to 67 percent of the population within three years.

Development workers have learned that clean water and better sanitation have benefits beyond parasitic disease control. Any developmental measure involving land or human settlements and water requires inter-sectoral cooperation and coordination at the planning stage. Designs must be altered in the light of disease considerations; cropping patterns must be anticipated; and water levels must be gauged.

Program evolution

Egypt was the first country to form a unit for snail control, and treatment began in 1927. In the 1930s, a department for endemic diseases was set up within the Ministry of Health, as was a research unit for tropical diseases and a training center for physicians and laboratory assistants. Thus, Egypt has over 60 years of experience with schistosomiasis control.

This historical record is not just a matter of pride or nostalgia for disease control workers in Egypt. It also has substantive significance — future schistosomiasis campaigns will depend for their success on fully understanding past campaigns.[1]

In the 1940s, control efforts were backed by ordinances and decrees. Law no. 58/41 stipulated compulsory examination of at-risk groups, and a decree in 1945 attempted to prevent surface water pollution. In 1948, Law no. 29 was devoted to snail control. However, these laws had little impact, and although they are still retained, contemporary emphasis is on achieving voluntary cooperation.

In the 1950s, under a resolution of the People's Assembly, the importance of schistosomiasis control was recognized and priority was given to areas involved with water and land development, areas where there was a rise in prevalence, and areas threatened by a new species. The country was divided into various areas to ensure an adequate balance between the challenge of disease control and resource availability. These areas were: Sinai, Suez Canal, Eastern Delta, Middle Delta, Western Delta, Giza, Fayoum, Middle Egypt, Upper Egypt, and High Dam Lake.

In 1955, the Government decided to mount a more systematic attack on schistosomiasis, then recognized as the largest health problem in Egypt. Pilot projects were instituted in two governorates chosen by the Tropical Diseases Institute. This attempt to begin comprehensive treatment was handicapped by a low budget and by the fact that the teams did not live in the villages. However, this experience proved to be a valuable stimulus to the development of local government because the idea was to involve the community in the development of a health center, a school, and a social and agricultural center.

Based on the experience of these pilot projects and other ongoing efforts, in 1975 the Government adopted a National Plan for Schistosomiasis Control. Endemic areas were grouped into 10 regions based on: (a) a common source of irrigation to ensure coordination of snail control programs; (b) a similar epidemiological pattern to assist control activities; and (c) natural geographical boundaries to help implement control measures.

Commitment to public health was also built at the governorate level, where the governor was the top authority. However, since the governor was also considered to be a vice-minister he was obliged to take advice from the Minister of Health. In effect this meant that the advisory role of the central Endemic Disease Control Department (EDCD) was legitimized. Control was effectively passed to local hands and the Ministry of Health changed its role from one of administration and direct management to one of technical supervision and evaluation. Ministry of Health officials with responsibility for endemic diseases accepted their valuable staff role for local health authorities.

1. Senior Egyptian public health officials have great awareness of the contributions made by leaders in the Egyptian public health movement. The pioneers were men like Neguib Ayad, Mohammed Abdullah, Saleh El-Hak, Faraq Risk Hassan, Almotaz Billah Mobarak, Mohammed Mousa, Mohammed Saif, Osman Zameity. The photographs of these leaders still hang prominently on office walls, and the innovations that they introduced are known and are regularly discussed.

Program strategy and activities

Schistosomiasis control

The Egyptian Government has sponsored schistosomiasis control for many years. Due to efficient drugs and molluscicides, improved strategies, and better basic health coverage, control measures have succeeded in producing and sustaining significantly reduced morbidity and infection.

The control program aims to limit the spread of infection, reduce morbidity, and control transmission. Control of morbidity implies reduction of schistosomiasis to a level of prevalence and intensity where it is no longer a major public health problem. Methods of control include large-scale chemotherapy of infected patients with metrifonate or praziquantel, environmental sanitation, control of contact with water, and area-wide molluscicliding of irrigation and drainage systems.

The Egyptian program concentrates on the three most important parameters — prevalence, intensity, and incidence of infection. Baseline data on prevalence rates are based on four different databases:

- Annual screening in sample surveys.
- Annual follow-up of a fixed population sample of "cohorts" at index villages.
- Annual returns of RHUs and health centers, recording the numbers of persons examined and the numbers detected as infected with *S. haematobium*.
- Bi-annual examinations of school children at the beginning of the school year in October and just before the start of the hot-weather transmission season in March.

Schistosomiasis is detected through laboratory examinations of urine and stools. The urine is examined by sedimentation, and the negatives are reexamined after centrifugation. Stools are examined by sedimentation for screening of *S. mansoni* and intestinal helminthic infestations.

In the preparatory phase, a village census is carried out for all households. Adequate population coverage is achieved by taking periodic samples of about one-tenth of total households, by examinating outpatients at rural health centers and units, by examining all schoolchildren twice yearly, and by paying special attention to occupational groups at high risk.

While very young children are seldom infected, those in the five-year-and-above age groups can be severely infected. Since children have high levels of schistosome egg excretion, and therefore contribute beyond their numbers to community egg production, it makes sense to concentrate on the below-14 age group. If prevalence is less than 4 percent, only that group is treated; if prevalence is 4 to 20 percent, the five- to 25-year age group is treated; if it is above 20 percent, the whole population is treated.

Chemotherapy

With the arrival of new and safer drugs that have fewer dangerous side effects, the program is beginning to deliver chemotherapy services with the same effectiveness and efficiency as snail control. Chemotherapy using praziquantel is effective, though expensive, and must be targeted to those with high intensity of infection. Treatment is aimed at alleviating symptoms and reducing the onset or magnitude of complications. It also tries to reduce transmission potential by reducing the number of ova available for community contact.

Metrifonate is cheap and effective, though only against *S. haematobium*. It also requires three doses, which are not always easy to provide. Precise treatment using metrifonate requires a good deal of energy and enthusiasm from health unit physicians and laboratory technicians, as well as good cooperation from the infected people. Metrifonate is used in Upper and Middle Egypt for treatment of *S. haematobium*; praziquantel is the favored single-dose drug for *S. mansoni*.

No drugs are used in control activities until they have undergone rigorous testing under local conditions, regardless of testing carried out abroad. This testing includes hospital as well as field trials. After tests have been satisfactorily concluded, no changes in chemotherapy regimens are permitted unless EDCD has been consulted and has approved the deviations.

In 1988, using metrifonate, chemotherapy compliance rates were 79 percent and 20 percent respectively in Minya and Assiut (north), with an overall compliance rate of 52 percent for Middle Egypt. In Upper Egypt, chemotherapy compliance rates ranged from 35 percent in Assiut (south) to 73 percent in Aswan, with an overall rate of 54 percent. High compliance rates were generally achieved in the treatment of school children, although there were instances of teachers handing

over all three doses at once.

These variable compliance rates have reinforced the belief that it is unwise to concentrate on chemotherapy as a principal control method. Reinfection can result from age differences between individuals, slow acquisition of immunity, different patterns of water contact, or different levels of intensity of infection prior to treatment. This suggests that increased resources may be required for maintenance, additional focal molluscumiciding, and chemotherapy in areas where the risk of reinfection is high.

Mollusciciding

Properly applied, an application of molluscicide can kill 99 percent of the snails; and the snail population generally remains below 5 to 10 percent of the original levels for some eight to 12 weeks after treatment. The first step in the control process is the active intervention phase. The object is to ensure rapid reduction in indices of infestation using area-wide mollusciciding. This involves three area-wide applications—in spring, summer, and autumn — based on known growth peaks for snails in spring and autumn and the probability of heavy water contact during the hot months of the summer. These activities are supplemented by an intensive chemotherapy campaign using mobile teams in addition to stationary primary health care units.

The next phase, consolidation, requires two area-wide applications in spring and summer in addition to mollusciciding of infested water courses; and a greater emphasis on chemotherapy of the younger age groups. The third phase — maintenance — involves one area-wide application in spring, and mollusciciding of infested water courses during the other seasons. During this phase, an even greater emphasis is placed on chemotherapy and health education; and limited snail control measures, such as selective area mollusciciding, are introduced, based on epidemiological data.

During the preparatory phase, baseline data are collected, recruitment and training of personnel takes place, and procurement of materials is completed. Complementary measures may also be initiated to improve water supply and sanitation. Environmental engineering aimed at changing the snail habitat may also be initiated.

Selective mollusciciding is carried out on large bodies of water, such as the Nile, where other methods would not work. There are several types of selective mollusciciding: (a) radial, where waterways serving dispersed villages are dosed; (b) focal, where transmission centers are treated; and (c) selective, where molluscicide is released into waterways serving a cluster of villages. The selective approach cannot be used during the active intervention phase, although for other operations it is economical in terms of application sites and the number of personnel required.

Mollusciciding operations are undertaken by snail control units which are under governorate supervision. These units comprise a supervisor and two laborers; the former is an experienced worker who reports to an agricultural engineer, who in turn reports to the governorate engineer. These personnel are well trained in snail sampling procedures and in the application of molluscicides. The engineers have all been trained in water-analysis for chemical concentrations, water discharge measurements, and irrigation and drainage practices.

During the intensive phase of integrated control in Middle and Upper Egypt, area-wide applications of niclosamide (Bayluscide R, 70 percent wettable powder formulation), have been made three times annually (in the spring, summer and autumn) in the irrigation and drainage systems throughout the project area. Focal spraying of molluscicide has, however, been undertaken in the Ibrahimir. At the beginning of the consolidation phase in Middle Egypt, the area-wide applications during the summer were discontinued and surveillance with focal mollusciciding only was substituted in order to reduce the quantity of molluscicide used and the cost.

Initially, the application of molluscicide in Middle Egypt was beset by a shortage of transport and equipment. Gradually, a high level of technical expertise was developed and most of the logistical problems were overcome through the local provision of vehicles and borrowed equipment. The availability of adequate numbers of vehicles from late 1977 onwards has ensured greater adherence to schedules during the various stages of mollusciciding.

In Upper Egypt, area-wide mollusciciding commenced in 1981, some two years after the introduction of chemotherapy. The new strategy for the Nile Delta required that canals passing through villages with high prevalence be fully treated. Villages with low prevalence were to have water contact points sprayed on a monthly

basis. The prevention of contact with infested waters through provision of safe water supplies was to be a complementary sanitation measure. Uncontaminated domestic water supply is available in most villages in the project areas.

Snail control

Snail control activities are organized at four levels — governorate, district, center, and unit. Snail control involves 1,702 organizational entities — including 21 at governorate level, 123 at district level, 332 at center level, and 1,226 at unit level. In 1989, there were 5,525 control staff, including 303 agricultural engineers, 2,095 assistant sanitarians, 199 laboratory assistants, and 620 drivers, clerks and storekeepers.

In each governorate, there is an inspectorate of snail control headed by an agricultural engineer and staffed with other agricultural engineers who manage operations. The inspectorate receives orders from the executive director of schistosomiasis control at the governorate headquarters, and advice from the director of snail control of the Ministry of Health in Cairo. It is responsible for all snail control operations, is the final collating center for data, and receives and distributes supplies and equipment. Normally, two vehicles are available for snail control; and the staffing consists of two agricultural engineers, two technicians, five clerks, two paramedics, and two drivers.

The district-level inspectorates of snail control supervise snail sampling and control, examination for cercariae, and molluscicding operations except large-scale operations supervised by governorate staff. Each inspectorate is expected to have at least one pick-up truck; and is staffed by an agricultural engineer, a technical officer, three to six health assistants, and two drivers.

At the next lower level, there are 72 centers, each staffed by an agricultural engineer, two technicians, one clerk, one paraprofessional, and a driver. The technicians examine snails for cercariae, oversee three to five snail control units, and are provided with a motorcycle.

A snail control unit is responsible for an area of 5,000 feddans (1 feddan = 1.038 acres) containing about 200 to 300 kilometers of watercourses which are expected to be surveyed every month. The 801 snail control units are usually staffed by a single technician and two para-professionals experienced in snail identification and collection. All unit staff are expected to have bicycles, and to do snail sampling for at least nine months of the year, covering 200 to 300 kilometers of canals and drains per month. The work is organized such that all canals in the governorate can be searched once a month. The snail control unit has workers who do the mollusciciding or weed control under the supervision of the district inspectorate.

Monitoring

For monitoring, the Egyptian system has developed its own standardized analytical procedures and guidelines, and these ensure uniformity of practice. The control teams have their own logistical support so that they can act independently. Monitoring is done by: (a) systematic random sampling and a regular re-examination of these same cohort samples; (b) bi-annual examination of school children; and (c) snail surveys in spring, summer, and autumn. Performance is assessed on the basis of the percentage of the target population screened and treated, the percentage of the watercourses surveyed and molluscicided, and the nature of the day-to-day quality control in the rural health units. Annual epidemiological surveys are performed by independent teams at index villages in order to check the following parameters: prevalence, intensity, incidence and morbidity due to schistosomiasis.

Organization of control

Organizational evolution

In administrative matters, the trend in Egypt has been toward decentralization as well as integration (the primary health care concept). During the 1940s, field implementation was the responsibility of the Rural Health Services. Legislation aimed at limiting the spread of infection by water was passed in 1945 and 1948. By 1952, when the Ministry of Social Affairs (made up of the Ministries of Health and Education) was formed, there were more than 200 rural health centers. However, endemic disease control continued to have a separate identity. Snail control units and centers were supervised by a local inspector, while endemic diseases hospitals and clinics continued to be supervised from Cairo by the Endemic Diseases Control Department.

In 1959, the Government took further steps to decentralize health activities to the local level. A

director of health was given authority over all directorates and units of preventive, rural, and school health activities. Although snail control activities were still organizationally separate, endemic diseases also came under local control, and no longer had a separate budget. Hospitals continued to be controlled by the Department of Medical Care in the Ministry of Health.

Executive power for a number of health functions was also decentralized from the Ministry of Health to the governorate level. In 1960, a local administration law grouped villages together, under the authority of a village council for service delivery purposes. The village councils were composed of locally elected members, nominees of the governor, and *ex-officio* members, including the local health center physician and the schoolteacher.

In 1962, the authorities realized that even though health services had been decentralized to the governorate level they were still too remote from people at the village level. A plan was drawn up to establish a health facility for each village of over 4,000 population; and it was expected that some 2,500 village health facilities would be constructed all over the country. In 1967, a law was passed covering the discharge of waste matter into canals and waterways and forbidding the washing of animals in watercourses or the performance of bodily functions in such areas.

In 1975, provision was made for the election of local government councils with a wholly elected membership from the district. These councils perform functions similar to those of the committee at the governorate level. In addition, they encourage financial contributions for the construction and maintenance of medical facilities. These contributions of money, land, or both have been a very important factor in the expansion of rural health care. During the 1970s, over 400 centers were built or significantly upgraded as a result of community participation.

In 1975, provision was also made for the establishment of health boards for every rural health facility. The board, presided over by the senior physician in the rural health units, included members of the health unit and local leaders appointed by the village council. It is responsible for operation of the units, approval of the annual local health plan and community-based solutions to local health problems. By 1975, district chiefs had been empowered with the same authority over health matters as an under-secretary to government; and the head of the local government unit had the same authority in health matters as a director.

Present organization and staffing

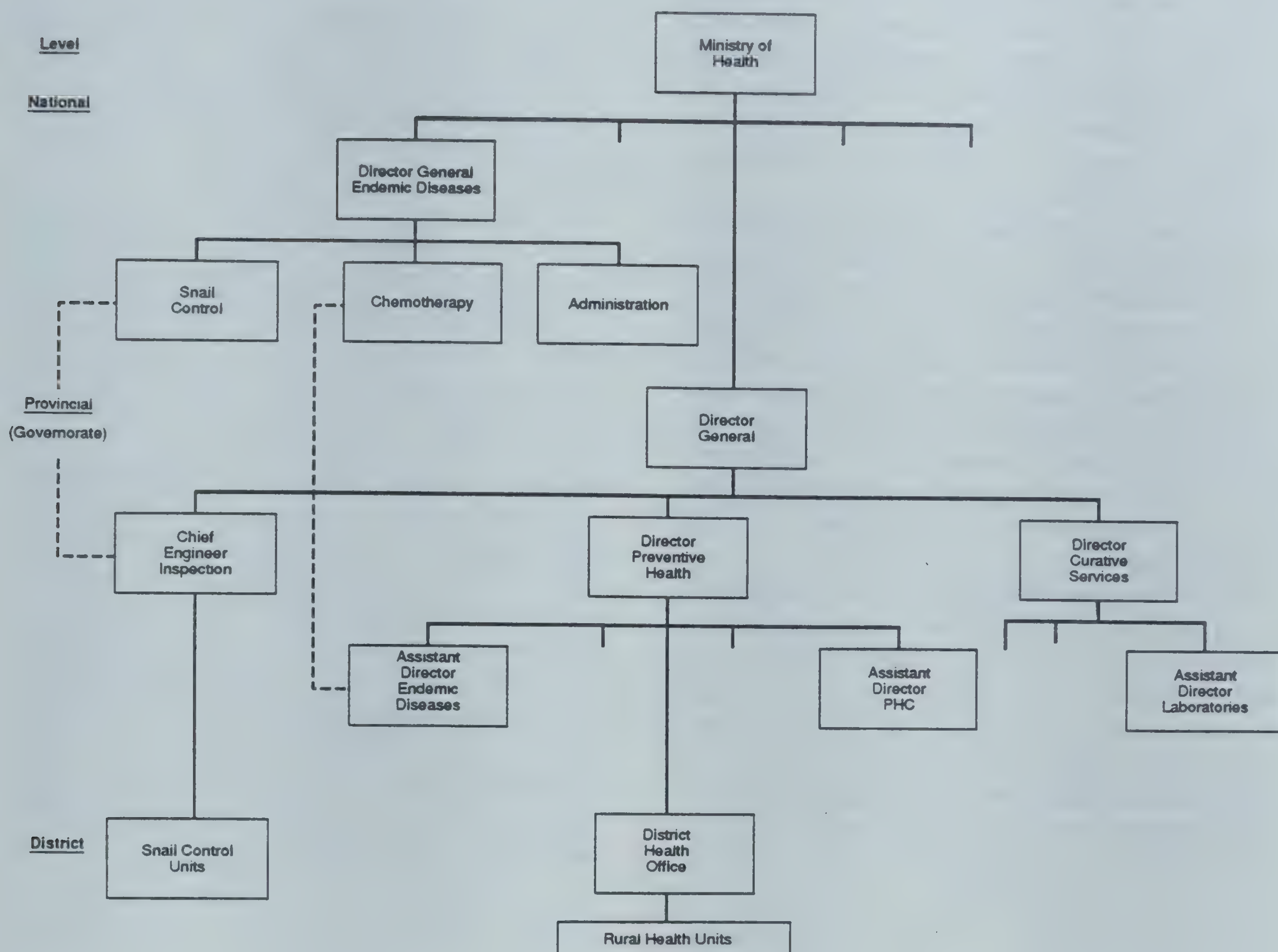
The Endemic Diseases Control Department (EDCD) of the Ministry of Health is responsible for schistosomiasis control. It has two main responsibilities: (a) diagnosis, treatment, and clinical and epidemiological work (which is demand driven, and occurs at any time of the year); and (b) snail control (which is supply driven, and has a seasonal aspect). Within the framework of the national program, the department is responsible for planning, logistics, procurement, supervision, training, evaluation and intersectoral coordination. In 1974, the Ministry of Health was reorganized, the post of under-secretary for endemic disease control was established, and the task of disease control administration was divided into schistosomiasis control and malaria and filaria control.

In the Ministry of Health, four levels of the system are important for schistosomiasis control (see Figure 3.1). At the top level, the minister of health is appointed by the president and works in coordination with the Board of Health composed of distinguished health specialists. The highest Board for Schistosomiasis Control is headed by the minister of health. It includes representatives of the ministries of agriculture, land reclamation, irrigation, and education. It also has representation from religious bodies and research institutions. The board is responsible for overall national policy, assignment of priorities, and coordination of relevant ministerial actions.

Directly under the minister's command is the Ministry Office Affairs section. This section has the following departments: communication, legal affairs, complaints, public relations, medical bureaus abroad, information, follow-up and supervision, governorate management affairs, planning and specialized institutions.

The first under-secretary of health, a top civil servant, is administratively in charge of 10 so-called central administrations, each directed by either an under-secretary or a director-general. The units are: preventive medicine; basic health care and family health; curative care; complementary medical services (laboratory, nursing, social medical services, and radiology services); administrative development (training, health education, research, and mobilization of man-

Figure 3.1 Organization of schistosomiasis control department



power in emergencies); dentistry; pharmaceutical affairs; development; supplies; and secretariat.

While the central Ministry of Health is in charge of all public health activities in Egypt, the responsibility for policy implementation lies with the health directorates in the governorates. EDCD is headed by a director-general for endemic diseases control under an under-secretary, whose primary concern is coordination. Within the EDCD there are three directorates: snail control, chemotherapy, and projects work. In Cairo, the EDCD has an establishment of four physicians, six agricultural engineers, four administrators, 16 clerks, eight technicians, 15 paramedics and three drivers.

The central department is responsible for planning, procurement, training, and evaluation. Although budgets are the responsibility of the governorate, in practice the endemic diseases control budget is separately prepared and approved. While there is no legal authority in Cairo to influence governorate allocations, in practice the EDCD exerts considerable influence.

The role of the director-general of EDCD, reporting to the minister, is crucial. He is in charge of all matters concerning health in the governorates, and also oversees several central departments, each headed by a medical director. These departments include: preventive medicine (including epidemic diseases); primarily health care (including endemic diseases); curative medicine; dentistry; pharmaceutical affairs; supplies and logistics; and school health. In addition, the director-general is in charge of these sections: legal affairs; finance, administration, and supervision; planning; training; paramedical training schools; public relations; complaints; health councils; and secretariat.

At the second level is the governorate; there are 26 governorates in the country. At this level, the director-general, a senior civil servant and physician, either of the rank of under-secretary or

(central) director-general, is in charge of the health department (see Figure 3.2). He reports directly to the governor (who, in turn, is appointed by and represents the president) as well as to EDCD in Cairo. A health directorate at the governorate level usually has an establishment of 10 physicians, 25 administrators, 50 clerks, and 40 paramedics.

The governor is formally in charge of health and is represented on the local committee. The executive director is joined on the committee by representatives of key sectoral agencies and municipal and religious authorities. The committee is responsible for the approval of the health sector budget. It also establishes priorities for service delivery, determines the siting of new facilities, is responsible for resolving local constraints to health service delivery, and oversees the general governorate hospital.

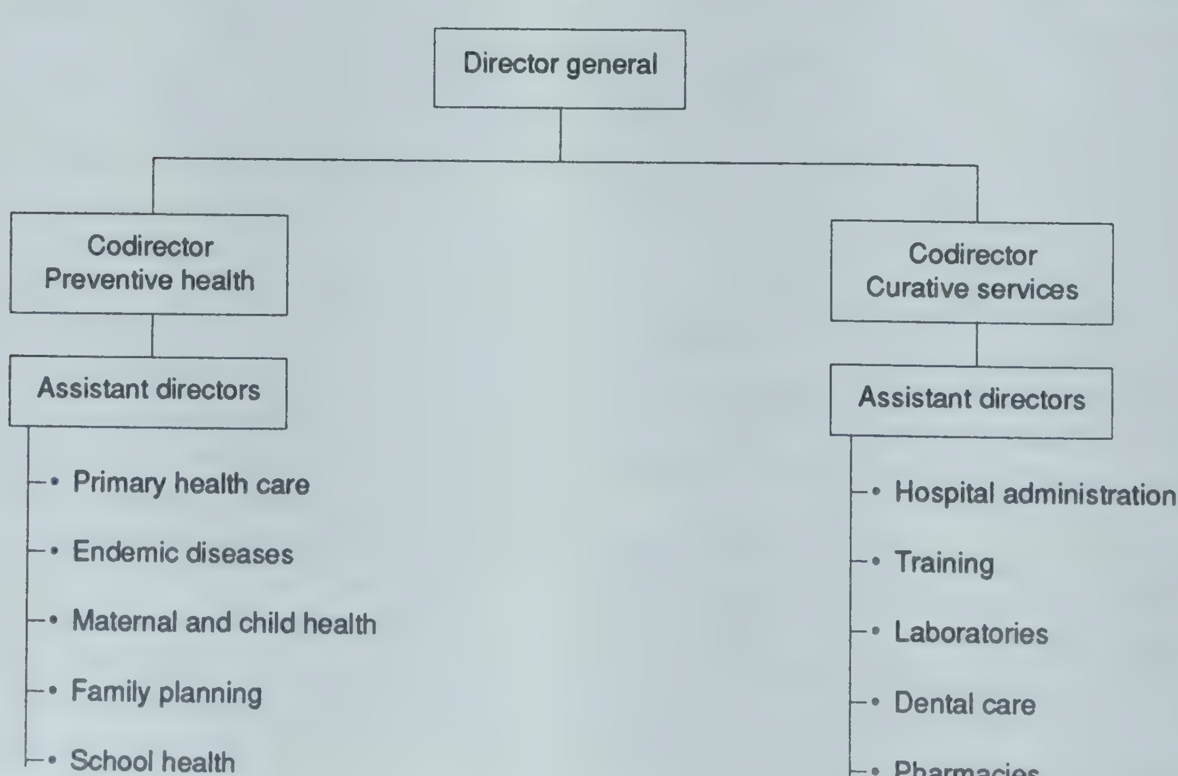
Executive responsibility for schistosomiasis control in the governorate rests with the director of health services — usually a director-general or under-secretary. The assistant director in charge of endemic diseases directly oversees control activities. He is assisted by especially trained staff — snail control engineers in the governorate's inspectorate of snail control, and a senior laboratory technician.

The third level is the district. The district medical officer supervises the control program in district health establishments — rural health units and centers, village hospitals, and endemic disease hospitals (there is also a general hospital). A health directorate at the district level usually has an establishment of one physician, five technicians, five clerks and 15 paramedics.

The fourth level is made up of rural health centers and rural hospitals which have subsidiary or satellite rural health units. The latter are located in villages with at least 4,000 population. Many of Egypt's villages are quite large — more than 4,000 villages having populations in excess of 10,000. At present there are 2,650 rural health units in Egypt. The government's objective is to ensure that no citizen is more than 3 kilometers from health care.

The rural health unit or center (if large) is usually headed by a young physician, and has a few paramedics and two clerks. For schistosomiasis-related work, the physicians' job is to ensure proper examination of urine and stool for schistosome ova and treatment of all positive cases as soon as examination results are received. Most people who come for such screening and treatment are out-patients from the village(s) served by the unit. School children are usually examined through mass school surveys twice a year.

Figure 3.2 Organization of governorate-level health services



Integrated health services

The rural health unit is the basic unit for primary health care and is involved in many kinds of preventive and curative health activities. All rural health institutions deliver basic health services in an integrated manner. The services provided at the rural health unit include: maternal and child health care; family planning; school health care; communicable disease control; endemic and parasitic disease control; environmental sanitation; health education; and curative medical care.

Hence, the Egyptian schistosomiasis control program is not separate from, or aloof from, other health programs in the country. Diagnosis and treatment of patients is undertaken at rural health units and district hospitals. The Ministry of Health directorate of schistosomiasis control, which has no direct line authority over field staff in the governorates, acts in a technical advisory capacity in relation to the rural health units.

At rural health centers, the services of physicians and laboratory technicians are shared by a number of health programs. EDCD-trained personnel work with a number of programs. Inter-program sharing of personnel, and the ability to shift staff between programs are important features of the Egyptian program. During program start-up or phase-down into the maintenance phase, there is flexibility to move personnel around as needed.

EDCD is not unique in the sense that other Egyptian health services — particularly those of a preventive nature e.g. population—are also organized on a program basis. Integration comes from sharing common facilities, and from taking advantage of the obvious benefits of working together on community-wide health problems. However, there still are differences between the endemic disease control program and other public health programs. For example, the population program does not have its own staff or budget, nor is it regularly exposed to strong technical review and control from the center. While all Egyptian health initiatives have a programmatic focus, the endemic disease control program has a clearer emphasis and is more tightly run.

Personnel management

Recruitment

Problems have been experienced in recruiting snail control workers. These workers are usually employed on a seasonal basis to help agricultural engineers and assistant sanitarians. Low wages and inflation have made recruitment extremely difficult. In Beni Suef, the problem was temporarily solved in an imaginative way by recruiting surplus former military personnel at the health centers. These recruits were more than happy to put on the uniforms and knapsacks of the snail control teams because both the uniforms and the methods of operating reminded them of military service.

However, over-staffing remains a major problem in EDCD. In Egypt, all university and secondary technical school graduates are guaranteed employment by the government. This has resulted in over-manning of all public services. It is informally estimated that the number of physicians in EDCD is adequate; the agricultural engineers may be three times (or 400 engineers) more than needed; and other categories range up to twice as many as required. There are also surplus employees among the 450 clerks, 1,000 technicians, and 3,200 paramedics in EDCD.

Training

From the beginning of control efforts in the 1920s and 1930s, training programs were developed to train physicians, laboratory assistants, laboratory workers and snail control teams. Training of physicians and laboratory assistants for health units and snail control centers was undertaken in a training center affiliated to the Research Institute for Tropical Diseases. In the mid-1960s, this center also took responsibility for training physicians who were recruited to man the growing number of health units in the rural sector. In the 1970s, additional training centers were developed in the governorates to train laboratory assistants. The role of EDCD's training activities changed to one of training trainers and controlling the quality of training in rural areas.

EDCD also produced its own cadre of disease control specialists. The early program leaders felt that newly qualified physicians had too clinical an orientation. What EDCD has done over the years is to take its physicians (and engineers) who enter the service as specialists with a reasonable academic background, and give them specific training for disease control. Over the next several years, these men and women are groomed for greater responsibility by being exposed to disease control areas beyond their own specialty. This broadens their knowledge and experience, and they become familiar with all phases of the operation.

The result is to turn a narrow specialist into a disease control professional who surmounts the limitations of his specialized training.

In the early days, newly qualified physicians were given two months pre-entry training in the examination of urine, stools, and blood for identification of parasites. They were also taught how to give the necessary treatment, and were normally expected to administer about 200 injections a day. The physicians' training also included mapping and registration of water courses, survey methods and techniques, application of molluscicides, and the examination of snails for different types of infections.

Development of professionals

In the Egyptian program, professional norms and standards are high, and everyone works hard to ensure that they are institutionalized. The program relies particularly on the broadly-trained "staff" people specialized in disease control (as discussed above). The staff organization emphasizes collegiality; because the numbers are small, people get to know each other's work. There is constant discussion of "good" work — what it is, what it means. The professionals want to do, and be recognized for, excellent work — they publish in scientific journals and attend conferences. They are aware that their program is one of the best in the world; and endlessly discuss past campaigns and why this or that decision was taken.

Doctors from Egypt's 30 medical schools, which graduate over 3,000 physicians a year, are required to serve for four years at a place designated by the Government. At the end of that period they may apply for a transfer to another post. EDCD usually has enough physicians to man the program. It is prestigious to work for EDCD. The schistosomiasis control program recruits and trains its own manpower. Retirees are usually replaced by internal candidates from the different Ministry of Health departments; it is not customary to externally advertise a specialist vacancy.

For professionals, the first year is hard. Junior staff, after working in the department, can be sent for further study (especially postgraduate courses) in Egypt or abroad. Those who have completed their one-year probation are seldom dismissed. Transfers, although theoretically possible, are not the norm. Postings to Cairo are particularly unpopular because of housing shortages.

Promotion is usually by seniority, although merit is also considered. Senior EDCD officials in Cairo monitor the progress of professional staff from the time they enter service. They get regular reports; and even though personnel files are held in the governorate, they exercise influence over the diversity of work experiences that young officers receive. This professional grooming for higher level positions has, in the past, lasted 10 to 15 years.

Compensation and incentives

Salaries for endemic disease control personnel are low. Allowances constitute approximately 40 percent of the average take-home pay. Physicians were given an allowance amounting to 50 percent of salary some years ago to compensate for the loss of private income. Inflation has eroded the value of this salary component. Many physicians feel that they ought to work two jobs; and many do. Young physicians want to specialize to a greater degree than is encouraged by EDCD because they see this as a way of increasing their financial security.

Engineers face a similar situation. In 1989, one irrigation engineer, to illustrate a typical problem, had a monthly salary of Egyptian pounds (LE) 120 and was considering an offer to work in the Persian Gulf for LE 2,000 a month. Another engineer, also earning LE 120 was supplementing his earnings by working as the manager of a hotel and earned LE 500 a month from this. It is estimated that roughly 80 percent of all EDCD employees hold two jobs.

To some extent, high job satisfaction in EDCD compensates for the low salaries. Professionals are proud of belonging to an elite group. They say the pay is low but the work is too important to leave. Physicians talk of their experiences in other branches of the medical service and contrast that work with disease control. The latter work evokes strong feelings — it satisfies deep-seated needs for accuracy and precision, and validates professional training. This feeling of being "special" is encouraged.

Management of operations

Community interactions

Early control activities concentrated on transmission control by providing technical and physical inputs; and the communities were not considered important for program success. In the 1940s, it was realized that community involvement and

participation are important. Health centers were constructed by Government on the condition that communities contribute land or funds. In addition, social centers were started at the same time under community control — the community built a house, laboratory and clinic, provided equipment, and contracted a physician to provide services.

Community control was strengthened in the 1950s by the creation of community development centers run by a board (with *ex-officio* representation and two members drawn from the community) and covering health, education, agriculture, and social concerns. In the 1960s, this trend was further strengthened under the law of local administration which expanded the board to include two elected members from the village community.

By 1975, the community had been given authority similar to a governorate director-general over all service units operating at the local level. Community participation was relatively easily obtained during the period of high disease prevalence in villages. This local support got reflected at governorate and, eventually, national levels. The Government made a vigorous attempt to improve public health. The problem of choosing households for screening on a regular basis was discussed with the community. Health education emphasized awareness, understanding and behavioral change. The introduction of praziquantel intensified the need for community education; the public had to be informed about the new drug and its proper treatment regimen.

The approach to community relations is notable for its pragmatism about trying to change entrenched social behaviors. EDCD believes that a general rise in the standard of living is a precondition for substantial changes in hygiene; so its approach emphasizes small feasible gains rather than big leaps. For example, previous health messages had received a negative response because villagers were told to "avoid water," an impossibility for farmers; later this message was changed to "do not pollute water."

Health education

Health education can greatly facilitate the changeover from vector control to extensive chemotherapy. Until recently, only patients with advanced symptoms were required to present themselves for treatment. Case detection on this basis is unlikely to provide adequate coverage. An early case detection capacity and an active search process are now necessary.

Reaching children in schools is considered important because the highest prevalence and intensity of schistosomiasis occurs in school children; and they are also a major source of water pollution. Schools provide a learning environment that can be readily affected by diagnostic measures, treatment, and health education. Also, teachers and children in schools can provide a channel for educating parents and the community. In rural Egypt, there are more than 10,000 schools with 100,000 teachers and 4 million children.

EDCD also believes that while media contact is useful, face-to-face contact with villagers is essential. This is done not only by physicians, nurses, sanitarians, and laboratory assistants but also by school teachers and school children.

The program aims to improve awareness of various aspects of the disease. Lectures, posters, and films are used; and until recently were primarily directed at school children. Since 1989, a sensationally effective series of television "spots" have been put on national television in the evenings. Both prevention and treatment are emphasized. The television films cover the disease transmission cycle the dangers of urination and defecation in waterways, and urge those suspecting infection to get a check-up. They make the point that if the tests are positive, effective treatment can be obtained at no cost.

The new information, education, and communication (IEC) initiative is based on 12 video-films designed for particular target groups, with specific preventive health messages, and shown regularly on the nationwide television network. The television spots, which were the brainchild of EDCD, feature two characters. One is a small, somewhat emaciated, worried-looking peasant dressed in traditional Jeleba and turban. The other character is a big, hearty, robust sergeant-major type who has obviously never had a day's sickness in his life. The sick character is shown using or abusing canal water and complaining about severe symptoms of schistosomiasis. The robust character explains why he is feeling bad and gives him an explanation of what causes the problem, along with brief succinct advice on how to get help. He intones over and over again the horrifying list of complications that come from untreated schistosomiasis.

In the television films, as schoolboys swim in the waterways during the heat of the summer, the spots play an especially prepared theme music.

When shots of women washing clothes in the waterways are shown the same music is played. The spots are arresting, short, non-controversial, funny and effective. The actors have achieved widespread national fame since the television spots began, as have the disease control personnel shown in clinical roles or looking through microscopes at slides. The television spot has itself become a powerful morale booster for EDCD personnel. More importantly, there has been a phenomenal rise in the number of people going to health centers and demanding treatment. At the same time, EDCD has ensured that there were sufficient drugs on hand before beginning the spots. Continuous evaluation of the reaction has enabled EDCD to fill any communication gaps and to provide additional explanations.

Logistics

The efficient procurement and distribution of drugs by the EDCD has certainly contributed to the success of the schistosomiasis control project in Middle Egypt. EDCD calculates the drug requirements and sends requisitions to the Egyptian Organization for the Procurement of Drugs and Chemicals (EOPD), an affiliate of the Ministry of Health.

Because there is only one suitable supplier of schistosoma drugs currently used, the EOPD places orders directly and without international tender. Prices are approved by EOPD and EDCD officials before a definite order is executed. Goods arrive by ship in Alexandria and are trucked to the EOPD store in Cairo. The latter delivers goods to the EDCD store, from where drugs are trucked to various governorates. The governorates also distribute drugs to districts by truck.

When procuring molluscicide, the order quantity is calculated by EDCD, which requests purchase by the department of medical supplies. This department calls for international tenders through the Egyptian embassies abroad. Bids are collected and evaluated, and reviewed by an interdepartmental committee on which the EDCD is represented. The final purchase order is approved by the minister of health; after which the department of medical supplies places the order.

Goods arrive in Alexandria by ship and are directly trucked by private carriers to stores in the various governorates, with the transport charges paid by the Ministry of Health. Governorate stores distribute molluscicide according to each district's needs and mollusciciding schedules. The transport fleet, supervised by Cairo, is well controlled, and mileage books are kept for each motor vehicle. The life expectancy for cars and trucks is 10 years and for motorcycles is five years.

These logistical operations have been centralized because bulk purchasing of equipment, drugs, and supplies is more satisfactory than each disease control program procuring its own materials. Equally, with a good information system, it is possible for staff in EDCD headquarters to shift resources from one area to another on the basis of need and results, something that cannot be so readily or economically accomplished in a completely decentralized program.

Budgeting

In 1984, schistosomiasis control cost just over 8 percent of the per capita public health expenditure. In 1988, the cost of control had dropped to 5.2 percent. The financial allocation for schistosomiasis has increased from LE 28,000 in the 1920s to LE 12.7 million in 1989. In Egypt, schistosomiasis control programs are usually spread over an eight-year period — four years for active intervention and a further four years for consolidation and maintenance. These time-frames are also used for programming and budgeting.

The centrally-funded budget, at all four administrative levels, covers salaries and allowances, maintenance of facilities, and some mollusciciding. Donors finance imported drugs and molluscicides. Within a project area, the cost of a control program is about U.S. 20 cents per capita per year. Snail control is usually about twice as expensive as chemotherapy; and personnel costs represent about 40 percent of total project costs.

In Middle Egypt, during the period 1976 to 1984, snail control accounted for 69.1 percent of the total cost and chemotherapy 30.9 percent. In terms of input costs, personnel accounted for 42.6 percent, molluscicides 49 percent, drugs 3.9 percent, and transport the remaining 4.9 percent. The same cost structure applied to Upper Egypt. In 1985, the cost of control in Upper Egypt was U.S. 76 cents per capita. These costs have now been reduced to around U.S. 20 cents per capita despite the increased use of praziquantel, which is much more expensive than metrifonate.

Budgeting is on an output rather than an input basis. It is concerned with what is accomplished by, rather than the propriety of, expenditures. Budgeting, at national and sub-national levels, is adjusted to the program format and is of a high

standard. The Egyptian program personnel are good with figures and records. Where legal authority is vested in lower tiers of Government, these tiers take care of the recurrent budget for salaries, allowances, and maintenance while the national level takes care of procurement of drugs and supplies.

The budget is based on detailed campaign requirements. When decisions are made to launch a campaign or to move from one phase of a campaign to another, the number of people who must be protected is known, the terrain is known, and the likely cost of reaching the population is known. There are monthly reports which enable resource transfers to take place; and there are standard measures of output so that the efficiency and effectiveness of expenditures can easily be checked.

However, budgeting is becoming more difficult with the change in strategy from vector control to an increased reliance on chemotherapy. The demand for drugs is more difficult to estimate than vector control costs. Even the latter is becoming more difficult to estimate because of increased use of focal mollusciciding.

Cost savings have been given importance in the program. For example, the "reach" of molluscicides has been extended: in 1968 it was thought that the carrying distance was 12.5 kilometers; later experience has shown that under Egyptian conditions a carrying distance of 110 kilometers is possible. Some drugs have been used sparingly because of their high cost. In the case of metrifonate, tests have shown that under local conditions three times the dosage used in Brazil would be required, with proportionately higher costs. In 1968 expensive vehicles and machinery were used to dispense molluscicide; now these functions are performed by snail control teams using cheaper hand pumps.

It is obvious to most senior EDCD officials that more needs to be done to cover maintenance and other recurrent costs associated with the program. Capital budgeting is a large and important item, because drugs, supplies, and vehicles have to be imported. Capital budgeting, which is of a high standard, is helped by the fact that the programs' capital expenditures are not lumped with infrastructure, but instead are replenished on a regular basis.

Lessons of experience

The Egyptian Schistosomiasis Control Program has had to cover enormous bodies of water spread over great distances. It has successfully overcome the challenges presented by logistical problems of transport, drugs, and molluscicide supply, the complex and precise management tasks required for effective disease control, and low public-sector salaries.

There are some clear achievements: the program now has a relatively cheap and effective technological package which can be applied on a wide scale; it is able to rely on strong support operational research and IEC capabilities; and it has achieved a degree of control over field staff that facilitates the prediction and achievement of desired results.

In organizational terms, the Egyptian program has all the pre-requisites of a successful institution. It is a centralized agency with its own staff and clear lines of command. Within the Ministry of Health, EDCD has separate and independent budgeting and accounting systems, and its own network for logistics, including procurement and distribution of drugs. EDCD also undertakes relevant research and has demonstrated that it can change with the times (as the recent health education campaign on TV illustrates).

EDCD personnel are good at planning — they set realistic targets and determine what is needed to reach them; and they are flexible during a campaign. Equally important, with regard to planning: (a) there is no separate cadre of professional planners; instead planning is an integral part of every professional's job; and (b) the planning is driven by technological needs and imperatives, and by implementation experience.

The following technical and administrative changes have directly or indirectly contributed to success: (a) building vertical program support at all four levels of the health system; (b) maintaining strong technical control at the center while encouraging effective local administrative control; (c) institutionalizing disease control technologies while developing the initiative and self confidence of individuals; (d) promoting the management role of the community; and (e) mastering the logistical arrangements that are vital for successful campaigning.

The following additional aspects of EDCD's role have also been important:

• *Controlling strategy, influencing tactics.* EDCD decides, and makes known to lower levels of the health system, the ideal way to deal with preparation for a campaign, as well as the ideal way to deal with the consolidation and maintenance phases. Field level staff are, of course, free to adapt these

guidelines to local conditions.

• *Financial leverage.* EDCD is the point of contact for donor funding and for the procurement of supplies that are essential for local disease control efforts. Donor money, mainly for drugs, molluscicides, and transport, is channelled through Cairo, since donors cannot enter into agreements with individual governorates. (The cost of schistosomiasis control met by donors is around 40 percent while some 60 percent of the total costs are met by the national Government.) Obviously this gives EDCD great influence even though disease control programs have their own budget at the governorate level. Obviously too, EDCD recommendations and actions in the allocation of central Government resources have great influence. This allocative influence undoubtedly predisposes the lower levels of the health system to seriously consider advice and technical instructions given by EDCD. EDCD's influence over the supply of materials is an additional source of leverage—it gives more materials, when possible, to governorates that are deemed to be more efficient and responsive than others.

• *Influence on personnel decisions.* Disease control within the country forms a technical hierarchy, with the most experienced and senior people working in Cairo. In an organization with strong professional norms, not only do these individuals serve as effective role models for more junior staff, but their opinions are usually sought on personnel matters, including promotion to senior positions. For example, EDCD is usually consulted about director-general appointments at the governorate level.

• *Prestige of the EDCD director-general.* EDCD makes sure that field staff who prepare technical reports visit headquarters on a regular basis. Visitors derive considerable prestige from being able to sit down with the director-general to discuss their reports.

• *Support for training.* EDCD also influences the public health training in the country. When the number of medical graduates increased, the training of physicians was decentralized to permit lectures, laboratory and practical work to be undertaken in the location where the physician would work. However, quality control was assured by having EDCD design a common curriculum, produce training materials, conduct training of trainers courses, and develop evaluation criteria. A similar decentralization accompanied by centralized quality control occurred with respect to the training of laboratory staff.

• *Dissemination of technical information.* EDCD, because of its "staff" system, and its close links with specialized research centers and institutes, is the undisputed technical leader in the control of schistosomiasis. It has maintained this position by the regular and timely production of technical manuals, by innovation in diagnosis and chemotherapy, and by perfecting the methods and technology used in snail control.

4

The Philippines: Malaria control

Introduction

The principal malaria vector in the Philippines is *Anopheles flavirostris*. Except in Cebu, Leyte, and Catanduanes, malaria is endemic in 72 out of the 75 provinces of the country. The breeding and survival of malaria vectors in the country are favored by optimal environmental conditions, particularly temperature, rainfall and humidity. *A. flavirostris* is most numerous at the beginning and end of the rainy season — the periods of peak transmission.

In the Philippines, the two important etiologic agents of malaria are *plasmodium vivax* and *plasmodium falciparum*. Malaria, a perennial leading cause of mortality and morbidity in the Philippines, fell to sixth place in 1970 and remained as such until 1984. Morbidity rates decreased from 1,000.7 per 100,000 in 1946 to 77.6 in 1970, even as the population doubled from 18.4 million to 36.8 million; mortality rates likewise decreased from 91.0 to 1.8. With the resurgence of malaria worldwide in the 1970s, morbidity rates increased by enormous proportions from 66.8 in 1971 to 202.1 in 1984 (Table 4.1 overleaf and Figure 4.1 on page 53) (Salazar 1988:27-8).

Despite the probable underestimation of mortality rates because of the inability to conduct laboratory confirmation in remote areas, Salazar (1988) points out that there is clearly an upward trend in the mortality and morbidity rates. In 1983, malaria incidence was established at 5.9 per 1,000 population. This figure grew to 15 per 1,000 population by 1987. As of 1987, the total population at risk was over 10.5 million.

A 1982 pilot study in a high-incidence area in Banauang *barangay* (in Bagac province, Bataan) revealed that:

- Most malaria patients were working people ages 16 to 35 years; thus affecting the productivity of the community.
- Males were affected three times more often than females.
- The total cost of malaria to the *barangay* was estimated to be 6,072 pesos or about 54.83 percent of its total earnings (Salazar 1988:90-91).

The challenge and complexity of malaria as a disease is inextricably bound with the interaction among three biological actors: mosquito, parasite, and man. On the basis of the current state of knowledge or the epidemiology of the disease, five basic approaches to the control of malaria have been identified: a) attack the parasites in the human host (through drugs and hopefully, in the near future, a vaccine); b) reduce the contact be-

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Table 4.1 Malaria morbidity and mortality rates (1971-84) and parasitological indices (1971-87)

Year	Population	Population at risk	Morbidity		Mortality		Slide positivity rate	Annual parasite incidence
			Number	Rate/100,000	Number	Rate/100,000		
1971	37,959,000	11,433,109	25,338	66.8	547	1.4	3.04	3.2
1972	39,040,100	11,575,121	27,090	69.4	656	1.7	3.30	2.4
1973	10,219,000	11,857,517	31,999	76.6	845	2.1	7.20	6.1
1974	41,457,100	11,157,908	27,420	66.1	938	2.3	7.33	7.47
1975	42,517,300	12,028,879	27,077	63.1	1,018	2.4	6.4	5.8
1976	43,751,300	13,914,846	35,553	81.3	997	2.3	5.4	5.2
1977	45,005,300	14,268,709	29,955	66.6	974	2.2	7.8	6.8
1978	45,528,500	14,441,556	35,353	77.7	1,077	2.4	10.4	7.3
1979	46,580,400	14,631,273	31,779	68.2	1,142	2.5	8.6	5.9
1980	48,316,503	13,455,561	39,678	82.1	1,091	2.2	11.6	6.6
1981	49,536,022		44,118	89.1	1,071	2.2	12.3	5.8
1982	50,783,065	16,297,226	40,496	79.7	985	1.9	10.7	5.9
1983	51,973,651	15,142,521	55,091	105.9	1,086	2.1	12.5	5.9
1984	53,192,708	15,483,321	107,485	202.1	923	1.7	15.1	6.9
1985b		11,111,366					23.5	9.2
1986b		11,051,290					8.98	3.17
1987b		10,585,598					14.3	15.0

Source: Salazar 1988, tables III and IV.

tween humans and mosquitoes (by screening of houses, use of bed nets, and more recently the use of impregnated bed nets and clothing); c) reduce the mosquito breeding sites (by filling or draining of collections of water, and straightening and cleaning of streams and rivers to eliminate vegetation); d) attack the larval stages of the mosquito (through use of anti-larval chemicals and biological methods of larval control which includes the use of larvivorous fish, among others); and e) attack the adult mosquito (with pesticides such as DDT and dieldrin).

Program strategy and objectives

Historical evolution

The evolution and growth of the malaria control program in the Philippines can be divided into distinct phases: before, during, and after World War II. From this perspective, the chronology of the country's anti-malaria campaign is anchored on a major technological breakthrough — the discovery during World War II of DDT as an effective insecticide against mosquitoes, human lice, and plant pests (Salazar 1988:23).

Alternatively, the Department of Health's (DOH's) 1988-92 directional plan for its malaria control program divides the past 30 years of malaria control activities into four discrete periods: (a) nationwide malaria control, 1953-58; (b) resurgence of malaria, 1959-65; (c) reorganized malaria eradication, 1966-82; and (d) integration, 1983 to date. These periods coincide with the centralization-decentralization swings associated with the shift in the locus of control of anti-malaria efforts from a Central Office-based, specialized, vertical structure to a decentralized region- and province-based operation usually carried out by a multipurpose worker who is part of an integrated public health program.

These two approaches suggest two possible bases for studying the evolution of malaria control in the Philippines: (a) scientific and technological innovation in the search for effective ways of attacking the vectors; or (b) the program's administrative structure for implementing its control strategy.

Organized control efforts directed at a complex disease like malaria are bound to be complex and multidimensional. Undue emphasis on any one factor — either the technological developments alone or the nature of the program's structure — is inappropriate because it overlooks the many factors that can affect the magnitude or the extent of the disease.

In the Philippines, malaria control efforts seem to have followed a six-stage cycle which has gone around twice between 1950 and 1988. The first cycle spans the 1950s and early 1960s (1950-66), while the second cycle extends from 1966 to 1988. The six stages of this cycle and the events within

Figure 4.1 Malaria morbidity and mortality trends, 1966-86

Source: DOH Health Intelligence Service, *Philippines Health Statistics 1986*, p. 162.

each cycle are shown in Table 4.2 (overleaf).

This table indicates that the response to the malaria problem in the Philippines started with a strong top-down approach — with a centralized vertical structure within the DOH symbolizing the government's resolve to confront the challenge head on. With technical and material assistance from such donors as WHO and USAID, this concerted action achieved impressive results. The decrease in malaria infection and transmission in different parts of the country triggered population migration to areas cleared of the disease.

The use of insecticides and anti-malarial drugs, however, was not without adverse consequences. As in other malarious areas of the world, the Philippines had to contend with drug resistance. In addition, organizational changes within the DOH, for reasons extraneous to the administrative demands of the malaria control program, twice led to the decentralization of program structures at times when the program staff felt they could have achieved more if the vertical program structure had been maintained.

At present, the resurgence of malaria is possible due to the following factors: (a) insecticide- (DDT) and drug-resistance; (b) population movements and the deployment of military personnel to relatively isolated frontier areas; and (c) the decentralization of malaria control functions to a public health system unprepared to assume the added responsibility because of its limited personnel, laboratory facilities, and resources to carry out its other public health responsibilities. The cycle shows that a renewed and revitalized malaria control program entailed substantial technical and material assistance from international agencies.

Control strategy and approach

During the early 1900s, anti-malarial measures utilized in the Philippines included treatment with quinine, use of bed nets to prevent man-vector contact, and use of larvivorous fish or minnows to reduce mosquito populations (Salazar 1988:22). When it was established that the vector was a stream breeder and not a stagnant water breeder, Paris green, an arsenic-based product was introduced as a larvicide in 1926.

In the 1930s, mechanical and environmental control methods were used, including digging

Table 4.2 The six-stage cycles of malaria control activities, 1950-66 and 1966-88

Stage	*Events in the first cycle, 1950-66*	*Events in the second cycle, 1966-88*
1 Intensified anti-malaria campaign preceded by pilot projects Independent assessment conducted with international agency's support and technical assistance	1952-54 Malaria control pilot project in Mindoro 1955 Six-year Philippine-American plan for malaria control with U.S. and WHO assistance	!966 Independent assessment team recommended a recentralization program created through Republic Act no. 4832 Revised plans, extending external assistance to June 1973 signed by Philippine Government with USAID and WHO
2 Disease transmission declines	By 1956 impressive reduction of malaria achieved Objective of control changed to eradication	By the early 1970s, disease transmission has gone down
3 Population movement to areas cleared of malaria Movement of labor to mountainous logging areas Military activities in malarious areas	From 1948-60, migrants to Mindanao from non-malarious Visayas estimated at 1,600,000 Timber industry attracted migrant labor to logging camps	Political problems cause deployment of military personnel to some malarious areas Population migration
4 Resistance to insecticides Anti-malarial drugs discovered	1959 Resistance to Disedrin discovered in the Philippines	1970 *P. falciparum* resistance to chloroquine appearing in areas of the country International resurgence of malaria
5 Administrative decentralization implemented and malaria-control decentralized to regions and provinces	1959 Government reorganization implemented in the DOH resulted in malaria control being decentralized to 10 regional offices	1982 Executive Order no. 851 again decentralized malaria control functions 1987 Executive Order no. 119 sustained decentralization
6 Disease transmission increases and the annual parasite index goes up	1959 Yekutiel saw resumption of transmission on a considerable scale and fairly widely scattered distribution throughout the discontinuation areas	1986 Malaria became sixth leading cause of morbidity

ditches, clearing and sloping banks, clearing and terracing stream beds for rice cultivation, periodic flushing with automatic siphons, and sanito-aquanomic methods of damming streams for aquaculture (Salazar 1988:22-3).

With the discovery of DDT during World War II — and after a large-scale DDT pilot project in Mindoro had confirmed that DDT spraying was effective and economical — the country's malaria control program has relied heavily on spraying and chemotherapy as its main control measures.

Faced with increasingly scarce resources, and in keeping with WHO recommendations, the 1988-92 directional plan for malaria control incorporates three changes in strategy:

- It modifies its control objective — from eradication to control.
- It expands its previous strategy of relying mainly on insecticides and chemotherapy to a more integrated approach that includes biological, environmental, and personal protection measures.
- It encourages community participation in program implementation.

Every significant change in the Philippines' malaria control strategy has been undertaken with WHO endorsement. Table 4.3 summarizes the components of the ongoing integrated malaria control program. It emphasizes selective application of a mix of interventions, depending on the annual parasite index, a measure of the parasitic reservoir in the community.

Surveillance activities — to track the nature, causes and possible remedial measures for con-

Table 4.3 Integrated malaria control strategy

Area	Vector control: Chemical control	Vector control: Environmental management	Vector control: Biological measures	Case finding and treatment	Individual protection: IEC	Individual protection: Use of bed nets	Vigilance	Surveillance
Malaria-free					X		X	Optional
API <5/1,000	Focal only	X	Selective	X	X			X
API >5/1,000	One cycle per year	X	X	X	X	X		only up to API=7/1,000
API > 10/1,000	Two cycles per year	X	X	Optional	X			

API = Annual parasite index.

tinuing transmission — are undertaken in endemic areas. (The activities in cleared areas are considered "vigilance" efforts.) Case-finding and treatment basically entail identifying malaria suspects, examining them for parasites, and giving presumptive or remedial treatment after laboratory confirmation. Chemical control is through the residual spraying of houses with DDT. Environmental management seeks to prevent or minimize vector propagation through modification of breeding places (through drainage, filling and impounding of water, and clearing of stream banks). Biological control, an alternative form of vector control, resorts to the indirect or direct use of natural enemies of the vector, such as larvivorous fish, bacteria, or competitors. The program encourages community residents to minimize man-vector contact through the use of mosquito nets and insect repellents (DOH Operational Plan 1988-93:9-11).

Program objectives

The overall goal, reiterated throughout the various phases of the program, is to "reduce malaria endemicity to a level that will not interfere with socioeconomic activities of people residing in endemic areas" (DOH Malaria Control Plan of Operation 1989-93:2). This goal is translated into specific time-bound objectives that seek to: (a) reduce the levels of malaria incidence from an annual parasite index of 15 per 1,000 at the end of 1987 to 1.5 per 1,000 in 1993; and b) prevent the reestablishment of endemicity in malaria-freed areas.

The 1988-92 operational plan's statement of objectives and targets reflects WHO's influence on the country's objective-setting process. The plan states that "the general objective is in consonance with the WHO global objective of attaining an annual parasite index of one per 1,000 population by the year 2000. Targets will vary from province to province depending on its stratification of endemic areas" (DOH 1988-92 Directional Plan:5).

These national-level objectives are then translated into objectives at the regional and provincial levels. For example, the 1987 DOH Annual Report of Region III (where Bulacan is located) identified four objectives:

- Reduce endemicity to levels not hampering socioeconomic development.
- Prevent the reestablishment of endemicity in malaria-freed areas.
- Reduce malaria incidence by at least 15 percent annually.
- Support and strengthen community participation in the control of malaria (DOH, 1987:69).

Provincial program objectives, as stated in Bulacan's annual plan for 1989, are patterned after the regional objectives. For 1989, Bulacan's malaria control program sought to:

- Reduce incidence of malaria so as not to hamper socioeconomic development.
- Reduce cases by at least 10 percent annually.
- Prevent reintroduction of malarial infection.
- Develop and maintain community participation in control of the disease.

At the provincial level, for setting specific annual performance objectives, the local health resources and conditions are not given much consideration. The process of setting provincial targets is a fairly routine procedure; the 10 percent figure is set by the central Malaria Control Service (MCS) in Manila. At the district level, the 1989 operational plan had two objectives: (a) to reduce the morbidity rate from 1,138 to 758 per 100,000 by the end of 1989; and (b) to intensify case-finding activities.

Financial resources

Most of the money for malaria control comes from the government's annual appropriations. In addition, the MCS has received technical and material assistance from USAID and WHO. Support from USAID was phased out in 1973, while that from WHO has continued but has been limited to laboratory supplies (Santos, in Herrin and Rosenfield 1988:453).

Table 4.4 shows the public funds appropriated and actually spent for the program from 1984 to 1988. Until 1987, appropriations for the program were a separate expense item. The figures in the table show a distinct pattern. From 1984 to 1987, approved program appropriation for malaria as a percentage of the national budget consistently decreased. In 1984, approved appropriations of Pesos (P) 8.6 million constituted 0.39 percent of the national health budget. While the latter increased in absolute terms from 1984 to 1987, malaria appropriations registered a decrease. By 1987, malaria funding was only 0.20 percent of the national health budget. The program received a big boost in 1988, when program financial resources increased five fold.

A 1982 assessment of the relative costs and benefits of preventing and curing malaria in the Philippines revealed that:

• While the national budget for health remained constant at 4 percent through the years, The Malaria Eradication Service (MES) budget decreased from 8 percent in 1968 to 2 percent of the total in 1980.

• As a result of these reduced resources, the proportion of houses sprayed with DDT declined from 62 percent in 1970 (the target was 74 percent) to 20 percent in 1980, thus limiting the scope of the program to a level where it was no longer effective (Salazar 1988:91-2).

More recently, two departmental circulars have been issued to address the program's need to identify specific sources of funds which may be utilized to defray malaria operating expenses. Department Circular no. 2, dated October 16, 1987 required regional health directors and provincial health officers to set aside funds for the hiring of skilled spraymen and malaria canvassers. Department Order 222-(A), series of 1988, authorized use of the 1988 and 1989 Primary Health Care Fund to finance wages, travel expense vouchers and sundry expenses of malaria spraymen, as well as to augment the travel vouchers of other malaria field personnel.

Program organization

Historical evolution

Between the 1950s (when the structure for a nationwide malaria control program was established in the DOH) and 1982, the locus of control and responsibility shifted twice between a vertical program structure directed and managed from the central office in Manila to a decentralized integrated organization in which responsibility for field operations and program implementation rests with the regional and provincial health offices.[1]

From 1953 to 1959, the Division of Malaria was virtually an autonomous unit within the DOH, with its director exercising line authority over 30 field units. He managed the program's support and administrative services which provided the personnel, supplies and equipment, and financial and other resources needed to undertake an extensive malaria eradication program that employed approximately 2,000 persons annually. (MES 1961 Special Report:7) The basic rationale

1. For details of the evolution and present structure of the Department of Health see the Annex of "The Philippines: Schistosomiasis Control."

Table 4.4 Malaria control program appropriations and actual expenditures, 1984-88

	1984	*1985*	*1986*	*1987*	*1988*
National budget ('000 P)	2,187,099	2,341,919	3,272,270	4,147,565	4.999,154
Approved program appropriation ('000 P)	8,683	9,240	8,345	8,326	
Percentage of national budget (%)	0.397	0.392	0.255	0.201	
Program allocation (P)	6,927,196	7,267,000	6,145,000	7,599,577	36,439,000
Actual program expenditures (P)	7,146,904	7,130,856	5,133,813	6,249,041	34,928,628

Source: "Appropriations Act CY 1984-1988," DOH Accounting Department, Manila.

for this highly centralized and specialized structure was the urgency for containing the disease before insecticide resistance set in.

This organization was first decentralized in 1960 when a government-wide reorganization proposed the creation of 10 regional health offices within the DOH. The Malaria Division became a staff bureau with advisory functions — essentially of formulating plans, programs, policies, regulations, and criteria for the eradication of malaria. With assistance from the regional malariologist, the regional health officer assumed executive responsibility for the direction, administration, coordination, and supervision of the program's line operations. As a result of these changes, responsibility for a concerted country-wide attack on malaria was transferred from a single semi-autonomous control unit to 10 decentralized functional units (eight regional health offices, the Malaria Division, and the Office of Administrative Services).

The initial successes achieved by the intensive malaria control programs in the 1950s were reversed in the early 1960s by population migration, mosquito resistance to dieldrin, and the administrative dislocation caused by the untimely decentralization of implementation responsibility.

The deteriorating malaria situation prompted the recentralization of malaria efforts in 1966. With the passage of Republic Act 4832 in July 1966, the Malaria Eradication Service was created and all malaria eradication activities of the Malaria Division and the eight regional health offices of the Ministry of Health, including personnel, equipment, vehicles, supplies, materials, and appropriations were placed under MES control.

From 1966 to 1983, the MES operated as a full-fledged vertical program with the following four divisions in its Central Office: (a) epidemiology, research and training; (b) malaria evaluation and statistics; (c) field operations; and (d) administration. At the forefront of its field operations were six area field offices which coordinated and supervised the activities of 36 malaria field units, the backbone of the program. Every area field office had its own set of personnel who carried out health education, epidemilogical, field operation, and administrative services. The 36 malaria field units were responsible for spraying every human habitation twice a year and for house canvassing for fever cases. They investigated the source of infection of every malaria case and took appropriate remedial measures.

On December 1982, Executive Order no. 851 mandated the integration of the promotive, preventive, curative, and rehabilitative components of health delivery. It reorganized the (then) Ministry of Health as a step towards accomplishing this integration. This move marked the end of the vertical program structure for malaria control under the Malaria Eradication Service.

As noted above, the MES became a staff bureau at the central Ministry of Health. The executive order stipulated that the line functions of the MES, as of other staff bureaus, including their control over appropriations, records, equipment, property and personnel, be integrated into the appropriate regional health office. Field operations of staff bureaus were also to be integrated into the provincial health office within two years of government approval of the ministry's reorganization.

As in the 1960 reorganization, this radical change in the structure of the malaria control program was prompted by broader health concerns other than the particular needs of a specific disease control program. To overcome the wide gap between the public health and public hospital systems, the minister of health (Dr. Jesus Azurin) proposed the issuance of Executive Order 851 which envisioned unifying the two key components of the Health Ministry. Azurin justified this controversial move, when he discussed the outcome of the integration, thus:

> In essence, the integration streamlined the operations of the Ministry of Health by establishing a unified and continuous line of authority and responsibility from the central level to the district levels. The artificial line that separated public health from medical (hospital) practice was removed, resulting in a more comprehensive delivery network at the local level. (Azurin 1988:43)

The consequences of the 1982 integration on vertical, disease-oriented structures within the DOH were apparently not fully anticipated nor carefully planned for. Not enough attention was given to administrative adjustments that might have cushioned the impact of the sudden shift in locus of control from the central office to the field offices at a time when responsibility for other programs (e.g. schistosomiasis) was also being delegated to the field offices, particularly the RHUs.

To implement this transfer of program control and supervision to the regional and provincial levels, all program resources were handed over to the provinces. Funds, vehicles, equipment and personnel, which were earlier under the Central Office's control, were now placed under the integrated provincial health offices. Malaria supervi-

sors, canvassers, and spraymen (some of whom had been in service for over 20 years as casual personnel), had great difficulty obtaining alternative positions because of their limited educational qualifications. Some malaria personnel had to take up other kinds of work, e.g. as security guards in hospitals. Those who could not obtain suitable jobs in the provincial health offices opted for other lower-paying jobs in their native provinces.

As a result of the integration, malaria control personnel felt that they had lost status and job security because the institutional core of the program — with which they had a strong sense of professional identification — had contracted. Malaria control workers, especially field personnel, became severely demoralized.

The need for such integration of malaria control had, however, been foreseen by the MES. In 1975, a pilot project on malaria integration in four provinces (Ilocos Norte, Ilocos Sur, La Union, and Marinduque) had been launched. The project sites were provinces that qualified as "premaintenance" areas, i.e. areas originally malarious but now declared non-malarious or with only a few foci. The pilot project provided the MES an opportunity to determine the appropriate mechanisms for integration that would ensure that the Philippines' health service delivery system could continue to implement vigilance measures with minimal help from the MES. This could, in turn, enable the MES to channel its limited resources to areas where malaria was still a problem. This project was also a crucial preparatory step in evolving a national policy on malaria integration with the general health services.

On November 1978, three years after the MES launched the pilot project, a WHO team of experts assessed its status. The assessment report concluded that:

• While the project had generated awareness of malaria activities among RHU staff, and a willingness to undertake surveillance activities, the MES staff still carried the main responsibility for malaria control and the RHU's role had been confined largely to case finding.

• The RHU networks' case detection outputs varied considerably from place to place and over time.

• In areas of potentially high risk, canvassing for active-case detection was still required. Passive-case detection was usually inadequate because of the areas' inaccessibility (mountainous terrain, and isolated and scattered population). In such areas, active transmission had occurred in a number of foci in Ilocos Norte, Ilocos Sur, and Marinduque.

• To determine vigilance requirements, localities had been classified by the assessment team as potentially high, moderate, and low or non-malarious areas. The team also suggested that the epidemiologic situation be reviewed annually.

Overall, the assessment team felt that since malaria "integration" had been in operation for some time, it had reached a "fairly stable state." Although the pilot project had many cross-linkages between the general health services and the MES, full operational integration had not yet been achieved. While the RHUs had contributed to increased vigilance, there had been no corresponding reduction in inputs provided by the MES (Chen and Herniman 1979:16-7).

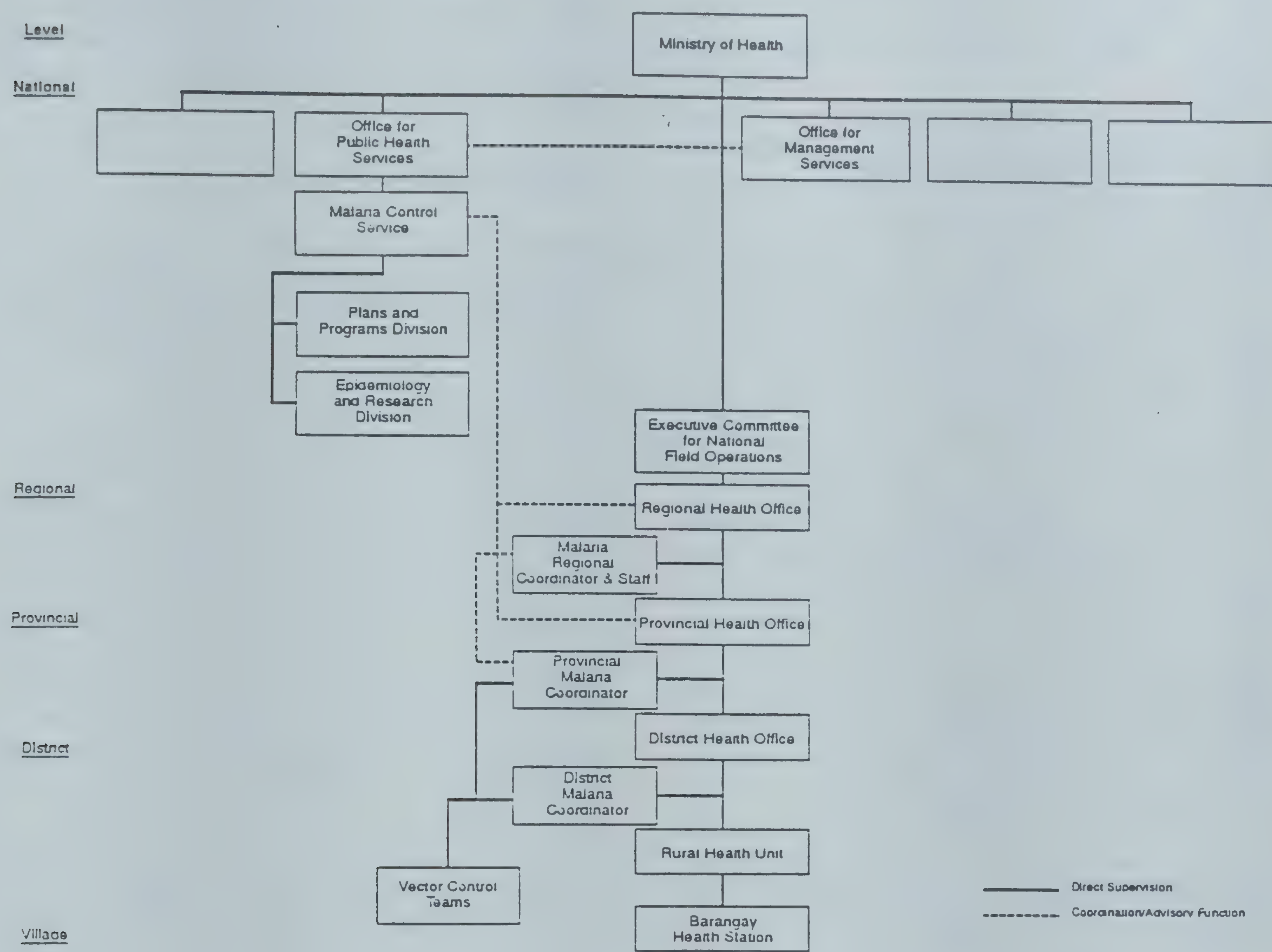
Central organization

After the Aquino government assumed office in 1986, the DOH went through another reorganization in 1987. Despite the written proposal by the MES director (Delfin Rivera) that the program be allowed to revert to its earlier vertical structure, the MES — now renamed the Malaria Control Service (MCS) — was retained as a staff bureau. Executive Order no. 119 formalized the new structure and the distribution of functions among the units of the DOH.

Under the reorganized set-up, the Malaria Control Service became a bureau under the Office for Public Health Services. As a staff service, it was to be responsible for policy formulation, standards development, program development, and monitoring of disease control and service delivery programs implemented by field offices. More specifically, Executive Order no. 119 vested the MCS with the tasks of "formulating plans, policies, programs, standards and techniques relative to the control of malaria; providing consultation, training and advisory services to implementing agencies; and conducting studies and research related to malaria and its control."

The task of formulating, implementing and evaluating the integrated malaria control program became a joint responsibility of all levels of the country's public health system. Figure 4.2 depicts the lines of administrative and technical supervision that link the MCS in Manila to: (a) the regional health office, where the malaria regional

Figure 4.2 Organizational structure for the malaria control program



coordinator is based; (b) The provincial health office, which directs implementation activities in the province; and (c) the district health office, which supervises malaria control activities carried out in the rural health units and *barangay* health stations in its catchment area.

As a staff bureau, the MCS's functions are undertaken by its two divisions: the plans and programs division, and the epidemiology and research division. The former division formulates, develops, and updates plans, programs, vector control strategies, and information and educational materials. On the basis of these plans, it establishes the program's logistical and budgetary requirements, and allocates insecticides, chemicals, reagents, drugs, spray cans, and spare parts. It also provides training, consultancy, and advisory services to field offices.

The epidemiology and research division's main responsibility is program monitoring, evaluation and documentation, conduct of epidemiological evaluation and research, preparation of reports, and provision of data on malaria as needed by other sectors. It is also responsible for strengthening the program's linkages with other government activities.

Field offices

Responsibility for implementing policies and programs developed by staff bureaus was given to the DOH's regional, provincial, district, and municipal level field offices. The tasks become progressively more specific as one goes from central to village levels. Essentially, two kinds of supervision are undertaken: administrative and technical. Heads of regional, provincial, and district health offices exercise administrative supervision over functional units directly under them; technical supervision of malaria control is

provided by designated program coordinators at regional, provincial and district levels.

The administrative supervision and technical guidance expected at each of these levels is as follows:

• *Regional level.* Besides exercising general supervision of the program in the region, the regional director is expected to: (a) designate a regional coordinator; (b) ensure availability of funds for hiring spraymen; and (c) provide logistical support for training and research activities. The regional malaria coordinator provides technical support, briefs and orients personnel assigned to the program, and conveys to field personnel developments in disease control techniques as disseminated by the MCS from the Central Office.

• *Provincial level.* The integrated provincial health officer has responsibility for over-all supervision of the program in the province, the general health service's focus of program implementation. His functions in the program include: (a) designating a provincial coordinator; (b) providing logistic support for operations; (c) setting aside funds for the hiring of spraymen; and (d) coordinating training and research activities undertaken in the province. The provincial malaria coordinator is primarily responsible for overseeing the conduct of vector control operations, the preparation and submission of provincial plans and programs, and in monitoring and evaluating the status of these plans and programs.

• *District level.* At this level, the district health officer assumes responsibility for over-all supervision of the program, paying more attention to its surveillance and vigilance aspects. He also designates a district coordinator who assists him in coordinating training and research activities and the dissemination of information and educational materials on malaria.

To further streamline the organization of the control program at the regional, provincial, and district levels, Department Order no. 167, series of 1987, provided for a "semi-vertical" organization at the provincial level. Figure 4.3 shows how this set-up allocates functional responsibility at the provincial and district levels. Vector-control efforts, primarily spraying, are under the direct supervision of the provincial coordinator, who directs sector chiefs, squad leaders and spraymen involved in spraying operations. The case-finding and treatment component is the direct responsibility of the district malaria coordinator who carries this out through the municipal health officers, the canvassers, and the *barangay* health workers who assist in the program's vigilance and surveillance activities. At the regional level, an epidemiological team assists the regional malaria coordinator. [To what extent these department orders are actually carried out in the field (in Bulacan) is discussed below.]

Malaria control in Bulacan

The province of Bulacan has the second highest incidence of malaria among the six provinces of Region III.[2] The 1987 annual report for this region noted that while the number of malaria cases in Bulacan averaged 380 over the five-year period 1981-85, the number of cases went up to 1,314 in 1986 and increased further to 1,187 in 1987. The provincial annual parasite index per 1,000 population for the same five-year period was estimated to be 15.3. By 1986, Bulacan's annual parasite index had gone up to 50 per 1,000 population, and by 1987 it was 54.1 per 1,000. This rapid increase in the index is a major cause for concern in the region (Annual Report, DOH, Region III, 1987).

At the end of 1988, Bulacan ranked seventh among the top 10 provinces with the highest incidence of malaria, even though its annual parasite index was down to 37 per 1,000 population. At present, malaria remains endemic in 18 *barangays* of five municipalities of Bulacan. This involves a population of over 31,000. In 1987, of the 18 *barangays* in these municipalities, nine had annual parasite indices of less than five per 1,000 population, while the other nine had indices of more than 10 per 1,000 population.

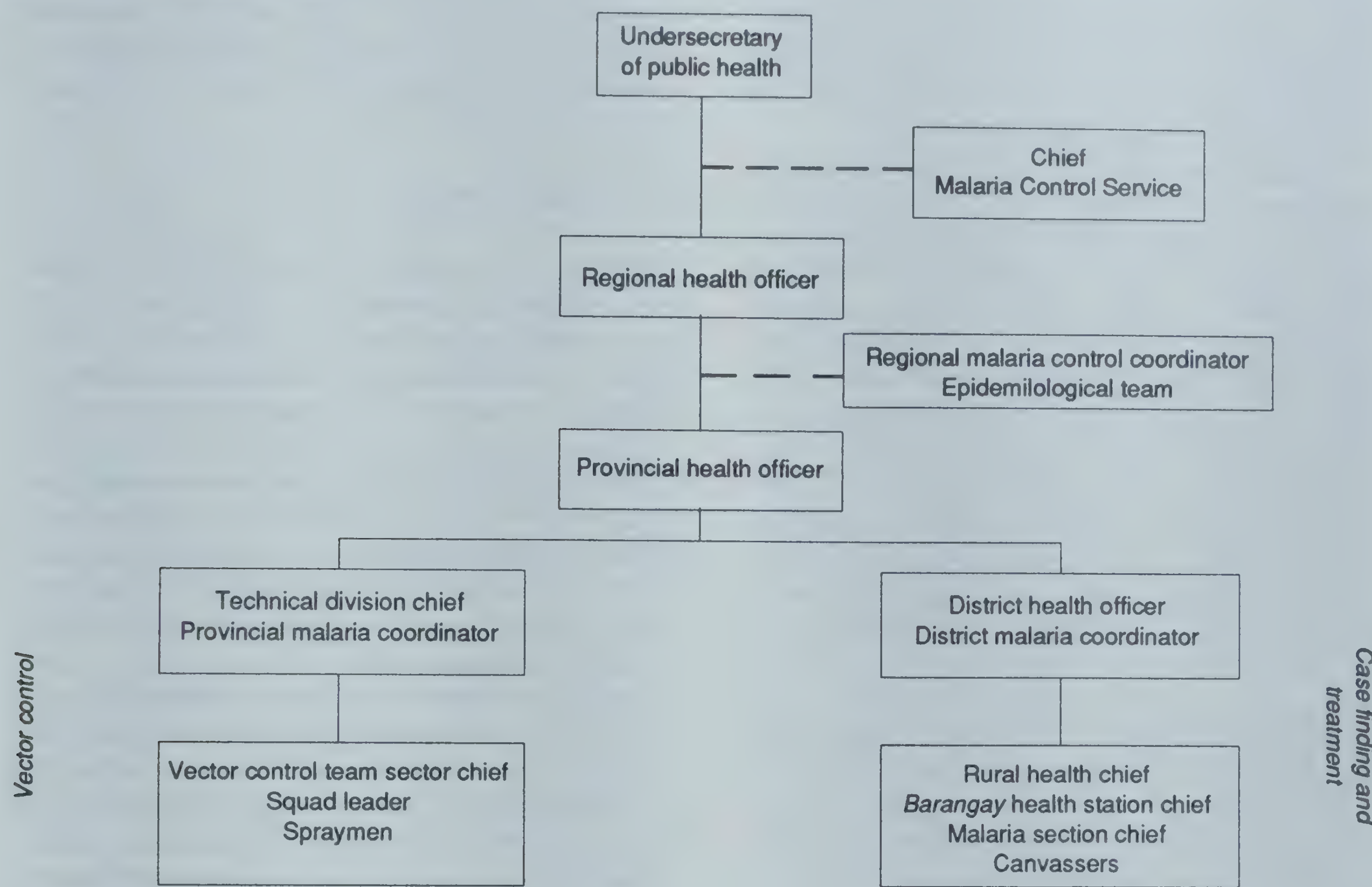
Regional-level malaria coordination

The regional malaria coordinator in Region III is a doctor who holds the position of medical specialist II. She was first designated regional tuberculosis coordinator on January, 1988; and a year later, she was given the additional assignment of regional malaria coordinator. She received a one-week orientation training from the MCS in Manila. She has responsibility for the province of Bulacan and also attends to two programs (tuberculosis and malaria) region-wide.

Given her work load, she tries to devote three

2. Bulacan has land area of over 2,627 square kilometers and an estimated population of about 1.4 million (or 23 percent of the population of Region III). It is divided into eight health districts and has 24 municipalities.

Figure 4.3 Organization of malaria control program at the provincial level
(Department Order 167, 1987)



days a week to supervisory visits, covering at least one province per month, allotting one day per district and visiting areas which are identified as low and high performers. A perennial problem in making these visits is the lack of transport, especially in areas which are not accessible even by public transportation.

Based on her first five months as regional malaria coordinator, she identified the following major constraints facing the program:

• *The number and quality of program personnel.* Department Order no. 167 has not yet been fully implemented at the regional level where there is still no epidemiological team. Because of this, there is no one who can check the technical aspects of the provincial coordinator's report. (She personally prefers that the provincial coordinator be a medical doctor.) Due to the lack of permanent positions, the program has to resort to the hiring of "casuals" as spraymen who get P65 per day or "volunteers" who are paid P7 per house sprayed. Because of inadequate training and low personal commitment to the program's goals, these volunteers' effectiveness is quite limited.

• *Quantity and quality of physical resources.* The supply of spraycans is inadequate as some of these are not functional. Program personnel have to go to the Central Office for the repair of spraycans and microscopes and for obtaining glass slides.

• *Synchronizing of malaria operations with release of health funds at the provincial level.* It appears at present that malaria is not a high priority program. To ensure adequate funds for malaria control when needed, the provincial coordinator and the provincial budget officers must make greater efforts to match available resources with the program's actual needs.

Provincial-level malaria control

Bulacan's malaria control team is headed by a provincial coordinator. As of June 1989, the team had 21 members, as follows: one provincial malaria coordinator, two supervising malaria spraymen, two malaria spraymen (assigned to the districts), two squad leaders, four canvassers, six spraymen, one microscopist, one draftsman, one clerical aide, and one epidemiological aide.

Except for the supervisory spraymen who are assigned to the district level and are paid from local (provincial) funds, all these personnel are national health employees. Supervising spraymen,

who are also assigned to the district level, are casual employees but work continuously for the year. Their appointment papers are renewed every three months. They get P32.85 per day plus a cost-of-living allowance of P700 a month and a P400 monthly transportation allowance.

Malaria spraymen, who are casual workers, are employed for 168 days a year. They get P65 per day. Canvassers work for 252 days on case-finding activities. Bulacan's provincial coordinator has worked with the malaria control program since 1968 as a casual sprayman. For eight years, from 1972, he was a casual worker until he was made permanent in 1980. He was assigned to Bulacan in 1983 soon after the integration.

The provincial coordinator was critical of the lack of importance given to the malaria program in the province. This neglect is obvious from the lack of manpower, pesticides, and vehicles for the program's use. From 1983 to 1985, Bulacan had only two full-time workers; most program staff were casual workers. Since 1983, there have been no tables and chairs for malaria personnel. Some casual spraymen did not wish to be rehired because of delays in issuing their appointment papers and in making payments. Unless someone personally follows up on his papers, a sprayman's wages are often delayed by about two months. Of the 10 spraycans given to the team, six are functional — which is adequate for the six spraymen. However, the supply of slide boxes and racks is inadequate. A more critical problem is the unavailability of insecticides at the appropriate time, i.e. before the start of the rainy season. Although spraying activities should commence by April, insecticides are usually not available by this time.

Overall, malaria control operations in Bulacan suffer from lack of financial resources, personnel, insecticides and equipment. However, the inadequacy of physical facilities and other basic needs for the public health system does not seem to be confined to the malaria program in Bulacan alone. The RHU IV of San Miguel also presents a sad picture of the state of health facilities.

Since it was not well secured, this RHU was robbed of its weighing scale, blood pressure apparatus, gas stove, electric fan, and tuberculosis and leprosy drugs. It has no running water and the artesian well near the RHU has no potable water. The municipal health officer decries the fact that they have no space for their records, nor are there adequate supplies and funds for the upkeep and maintenance of the RHU. The officer commented that he has no information on what resources are available for his unit because the district health office attends directly to the financial needs of the RHU. The RHU does not even have forms for submitting regular reports nor does it have a typewriter. It acquired a calculator only recently.

Municipal-level malaria control

The role of the RHUs (and of the health teams based there) in the malaria control program in Bulacan is also problematic. According to the health officers of municipalities that have *barangays* endemic for malaria, they have little to do with the malaria program except case-finding, giving treatment, and referring severe cases to the hospital. The municipal health officers are not aware of the activities of malaria spraymen in their area. The midwives and *barangay* health workers who collect blood smears deal directly with the provincial coordinator.

The deployment of the newly hired microscopist in one of the *barangay* stations of RHU IV is illustrative of the lack of coordination between the provincial malaria coordinator and the municipal health officers in the area. Until the case study research team visited the area, the municipal health officer did not even know that the microscopist had reported to the *barangay* station, nor had the microscopist met the health officer in the area where she was working. The newly recruited microscopist was given a four-day training on malaria control by the assistant provincial health officer for public health and one week of training on microscopy at the provincial hospital. As far as the microscopist was concerned, she reports directly to the provincial coordinator.

At the front line of the provincial malaria team is the squad leader and his team of spraymen. They, along with the canvasser, visit the critical malarial areas. The squad leader usually prepares a sketch map showing the location of each house in the area. These maps are then finalized by the draftsman in the provincial health office. Canvassers, on the other hand, take blood smears, and in physically inaccessible areas they also give presumptive treatment.

The dosage of drugs to be taken by household members who have had fever is written on the medicine wrapper by canvassers. Since there was no microscopist based in the area until very recently, canvassers used to bring the blood smears on Fridays to the district hospital for laboratory examination. Results would usually be available

after two weeks. Canvassers are expected to meet their quota of 60 slides per day or 300 slides per week.

Officially, there is a district malaria coordinator who exercises general supervision over the program's activities in the district's catchment area. In San Miguel, the task of malaria district coordination is an "additional" responsibility for a municipal health officer who acts as coordinator for all the public health programs — besides providing services to his own municipal health unit. The provincial coordinator observed that the malaria district coordinator has no technical role in supervising malaria spraymen's activities in the area.

Shortly before the field visits for this case study, the assistant public health officer of Bulacan attended a three-day seminar on malaria control organized by the MCS for Regions I, II, and III. This seminar triggered a series of events which may signal the start of greater attention to malaria control in the province. Immediately after she returned from this meeting, the assistant public health officer called a meeting of all personnel involved in malaria control in the province, including the provincial malaria coordinator and municipal health officers of municipalities with *barangays* endemic for malaria.

One positive outcome of this meeting was that greater coordination is expected between the program's spraymen and canvassers, and the municipal health officers and rural health midwives. While canvassers will now report to the midwives, the municipal health officers still will not have supervisory authority over the spraymen operating within their catchment areas. The municipal health officers expect that they will know more about the canvassers' and the spraymen's activities in their areas.

It was only during this meeting that canvassers informed the municipal health officers of the breeding places they have discovered. Supervising spraymen on the other hand commented that with the integration with primary health care, more malaria patients can be given assistance since malaria drugs are more readily available (at the RHUs and with the midwives).

Program planning and reporting

Despite the above noted difficulties, the program planning and reporting system is fairly well institutionalized. Planning is a top-down process, with the Central Office setting national norms. It also projects the population figures and sets program goals. The provincial and district levels only have to compute their annual targets based on the formulas and figures given by the Central Office. National "guidelines" virtually reduce planning and target-setting to a mechanical process of substituting population figures in a formula provided from the top.

The reporting system has also been standardized for the provincial malaria control staff. The provincial coordinator prepares a monthly report based on the data collected from the following sources: (a) spraymen's daily reports; (b) canvassers' weekly reports; and (c) supervising spraymen's monthly report. To enable the province to meet the region's deadline (tenth of each month), due dates for RHU, district and provincial reports have been established to allow time for data consolidation. Regular reports must be submitted on the following dates: RHU — seventh of the month; district — 10th of the month; and province — 15th of the month.

Summarizing, Bulacan's malaria control program might improve. Until now, the program seems to have suffered from the fact that the desired integration with field offices has not been fully achieved. This may have been due to two main factors: (a) program personnel were not fully prepared for, nor convinced of, the value and need for integration; and (b) the general health system's personnel did not fully anticipate the implications of absorbing the malaria program, and were not ready to utilize the malaria staff's experience in dealing with local conditions, especially in vector control and case finding and treatment.

Faced with the burden of having to prove their worth in a system where medical credentials determine one's status in the organization, the malaria field personnel (most of whom were casual employees for a number of years) have had difficulty establishing their credibility — despite the fact that some of the medical personnel had little training in malaria, and in some instances experienced malaria control staff knew more about the complexities of the man-mosquito-parasite interaction than is captured in medical books.

In Bulacan, this has produced ambivalence in the general health service system toward malaria control. While malaria control personnel may have lost the status they desired, the system cannot do without them because they understand the technical aspects of their job better than others. However, to effect the full integration of malaria

control, both the MCS and the provincial health officers must welcome their complementary roles, and should ensure better teamwork between the RHU staff and the vector control personnel. This would help satisfy an important assumption underlying integration — that control of the disease cannot be achieved without the full support of the RHU team, their network of midwives and *barangay* health workers, and the community.

Client interactions

Among the problems identified by the municipal health officers is the lack of educational and informational materials on malaria. Besides the fact that there are no active campaigns to inform the people of the nature of the disease in malarious areas, officers explained that they do not know of any attempt to monitor the client's knowledge, attitude, and practices in relation to malaria control measures. The officers have the impression that the program makes no systematic effort in encouraging people to be actively involved in the control of the disease.

Two studies of the people's perceptions about malaria control in the Philippines have been undertaken, and these could be useful for developing health education materials. The Lariosa study on culture, environment and people's perception conducted in Cabagan, Isabela revealed that the majority of survey respondents were not sure of the cause of malaria, and half of them thought that the real cause of the disease had yet to be discovered. About two-thirds of the respondents disagreed with the statement that it is possible to prevent the disease (Lariosa 1986:364-5).

The second study — an anthropological study on how the people had adjusted to their malarious environment in the same province — disclosed that some individuals believed: (a) that mosquitoes increase after DDT spraying; (b) that DDT is effective, but the last spraying was done in 1982; or (c) that DDT spraying is urgently needed as most people have no money to buy mosquito nets. Other popular notions about the causes and cures of malaria included: (a) don't take a bath when tired; (b) avoid mosquito bites; (c) avoid excessive drinking of cold Coke; (d) avoid over-fatigue; and (e) avoid disturbing a spirit in the rice field and drinking water from a pool where mosquitoes lay eggs (Abaya 1987:63, 83-5).

The Lariosa report also disclosed that of all the anti-malarial activities, the residual spraying of DDT is the best known. However, the respondents felt that their RHU or *barangay* health station was not aware of all the malaria cases in the community, nor did they believe their health workers did much in the community about the malaria problem. Those who gave blood samples for screening complained that it was useless because they could not get antimalarial drugs for free. Asked to evaluate the government's local health service delivery system, about two-thirds of the respondent believed service delivery could be improved by hiring additional personnel (Lariosa 1986:386).

Program performance

The municipal health officers believe that there is no systematic assessment of the malaria control strategy's implementation at the municipal and RHU levels. The municipal health officers have no say in the evaluation of program personnel assigned to their service areas. Since there is no feeling of teamwork or partnership with the provincial coordinators, officers do not get to analyze malaria statistics nor the status of the disease in the area until they are informed of it during the second half of the year. This may be because formal assessment of the overall malaria situation is done at the provincial level.

Overall, national performance indicators and parasitological indices for 1987 and 1988 (see Table 4.5) suggest that the program has been most effective in case finding and treatment (it overshot its annual targets). However, in house spraying, it had accomplished 74 percent of the target; and reduction in the annual parasite index has been quite limited.

In the case of Bulacan, the annual parasite index had been reduced to 37 by the end of 1988. This achievement has been attributed by the provincial coordinator to the hiring of 11 additional casual workers between 1986 and 1988. While case-finding and treatment figures and even house-spraying figures have gone up in 1988, Region III's annual report reveals negligible output on biological and environmental measures. This is attributable to the absence of propagation ponds for larvivorous fish and the lack of community participation in their efforts.

Concluding remarks

The Bulacan experience shows that in a public health system which suffers from a chronic lack of resources to carry out disease control efforts, there is an urgent need to work out a fully integrated

Table 4.5 Performance indicators and parasitological indices
(per 1,000 population)

Indicators	*1987 Actual*	*1988 Actual*	*1988 Target*	*Growth rate 1987-88*	*Percentage accomplished*
Treatment accomplished					
Case-finding	951	1,356	1,150	42.59	117.91
Presumptive	852	1,356	1,150	59.15	117.91
Radical	158	154	95	-2.53	162.10
House-spraying	271	651	880	140.22	73.98
Parasitological indices per 1,000					
Annual parasite index	14.55	13.9			
ABER	11.87	12.1			
SPR	13.83	11.4			

Sources: Philippine Development Report 1988:277; and Malaria Control Program, *Annual Report* 1988.

malaria control program whose control measures are known, understood and fully appreciated by all levels of field offices, particularly at the municipal and village levels that are closest to the people.

Even as the technical component of the program is recognized and given due attention by the general health service system, malaria control program staff units must accept that no vector control program can succeed unless it is community based. With decentralization, the field offices should be better able to respond to crucial seasonal needs for such inputs as insecticides. However, this can happen only if the program gets the necessary support both from the field and central office staff.

The Bulacan case, while not necessarily representative of all parts of the country, certainly suggests that technical supervision cannot be adequately provided by overburdened coordinators at the regional and district levels. The district-level should be given greater attention as it can provide crucial back-up resources for the municipal and the barangay service points. At present, this level is expected — but unable — to provide such services because of inadequate personnel and resources.

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5

The Philippines: Schistosomiasis control

Introduction

To understand how the schistosomiasis control program in the Philippines is presently organized, managed and implemented nationwide, one must first have a clear picture of how the Department of Health's (DOH) central and field offices have evolved and are presently organized. A brief overview of this is given in the Annex. The main text of the case study examines the schistosomiasis control program in detail, especially in the province of Leyte.

Disease incidence

Schistosoma japonicum is endemic in many areas in the Philippines. In 1987, some 1,160 villages (*barangays*) in 170 municipalities of 24 provinces in eight regions in central and southern Philippines were endemic for schistosomiasis (Blas 1988:77). These areas tend to have high seasonal rainfall or an evenly distributed rainfall throughout the year — conditions that enhance production of the snail intermediate host. A total of 2,990 snail colonies have been identified in endemic areas.

The total population of the endemic municipalities is over 5 million, of whom 1.54 million are at risk. With a prevalence rate of 6.6 percent for 1987, it is estimated that over 335,000 people suffer from schistosomiasis. Studies in Leyte, the case-study area, have shown that the number of deaths due to schistosomiasis is 1.78 percent of the estimated positive cases. Because of the nature of their work, farmers tend to have the highest infection rate, followed by fresh-water fishermen, tuba (local coconut wine) gatherers, and unskilled laborers (Blas 1988:81).

Initial pilot project

In 1949, a Schistosomiasis Research Program was started by the DOH. Based on a survey undertaken by this program, the seriousness of the schistosomiasis problem became known; and the DOH responded in 1951 by converting the research program into the Division of Schistosomiasis. The Philippine government requested and received assistance from WHO which sent a team of consultants in 1952. Upon recommendation of this team, a Schistosomiasis Control Pilot Project was initiated in Palo, Leyte in 1953. The main purpose of the project was to establish an effective and economical method of controlling the disease in a pilot area and, if successful, to design a national control program on that basis (Santos 1976:5).

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Three towns in Leyte were chosen as sites of the pilot project. By 1961, an expanded control team had been organized and four regional schistosomiasis advisory teams were deployed to Samar, Mindoro Oriental, Davao, and Lanao del Norte. Realizing the value of linking schistosomiasis control efforts within DOH with activities being undertaken by other government agencies, a National Schistosomiasis Control Commission was created in June 1965, with the passage of Republic Act 4359. Among the commission's major functions was the formulation and implementation of a schistosomiasis control program which was to be coordinated with the activities of other government agencies whose projects and programs had schistosomiasis control as a component. (Further developments in the organization of the national schistosomiasis control program are discussed in a later section of this case study.)

Program strategy and objectives

Control strategy

Initially, the schistosomiasis control strategy tended to focus on preventive action. This was because an effective anti-schistosoma drug was not yet available. Four inter-related approaches were utilized in the national control program prior to the use of praziquantel (the drug now being used): (a) snail control through the use of agro-engineering measures like drainage, ponding, filling of ditches, and scientific agriculture; (b) environmental sanitation through proper waste disposal, provision of safe water for domestic use, and construction of footbridges across snail-infested streams; (c) health education through the distribution of IEC materials, film shows, and lectures in community assemblies seeking to explain how the disease is acquired and transmitted; and (d) limited treatment of cases (Blas 1988:4; Santos 1976:5).

The agro-engineering strategy as a mode of control proved too expensive, especially if the cost was charged to the health budget alone. Environmental sanitation and health education, on the other hand, were contingent on behavioral changes which require a long period of time, due to the people's traditional beliefs and cultural practices.

A major shift — from transmission control to morbidity control — was introduced when praziquantel was found to be effective in trials conducted in Leyte. This enabled the DOH to embark on a control effort, on a modest scale, based principally on case detection and treatment and supplemented with environmental sanitation and health education. This also raised expectations of reducing schistosomiasis to manageable levels.

Research on the effects of praziquantel has given program administrators a better basis for planning under conditions of limited resources. To determine the effect of treatment on transmission of the disease, studies were conducted in two *barangays* of Irosin, in Sorsogon. The results of this research indicated that prevalence rates declined after the first, second, and third treatment, but further treatment produced a slower decline in prevalence (Santos 1984:439-45). With this information, and given very limited manpower and material resources, the researchers pointed out that "...a 90 percent reduction in the prevalence of the disease can be achieved in one to two years time if 100 percent of the exposed population is examined and the positive cases are treated every year; and in three-, six- and 15-years time if 75 percent, 50 percent and 25 percent of the population are examined respectively, and the cases found are treated initially and the same proportions of the rest of the population at risk are covered in the succeeding years and repeated annually thereafter" (Santos 1984).

The strategy of giving top priority to provinces with higher endemicity, subject to availability of resources, was proposed as the modified control approach. It was suggested that mobile microscopy units be concentrated in priority endemic provinces. The strategy in 1986-89 was to:

- Examine about 50 percent of the exposed population in the different provinces and to treat 100 percent of all the positives.
- Intensify the health education campaign.
- Examine 100 percent of all individuals one year old and above in provinces where there were sufficient microscopists (SCS, Annual Report 1988:2).

In 1988, a further stratification was agreed upon at a WHO-assisted workshop in Zamboanga City, attended by regional health directors and provincial health officers and coordinators. While results were expected only after three years of implementation, for 1989 it was proposed that:

- For places with higher endemicity, stratification on the basis of prevalence rate would be adopted. Municipalities with a prevalence rate of 10 percent and above would be covered continuously for two to three years or until the rate was brought down to the 10 percent level. In munici-

palities with less that 10 percent prevalence, the interval of case finding could be every two to three years. For places with prevalence of less than 5 percent, the interval of stool examination would be longer. For the latter areas, targeted mass stool examination of elementary school children would be carried out to maintain the relatively low endemicity.

• For provinces with a prevalence of 5 percent or less, instead of spreading efforts too thinly in all endemic municipalities/*barangays*, efforts would be concentrated in 50 percent of the endemic municipalities, targeting 100 percent of all individuals aged one year and above. The other 50 percent would be covered the following year, and alternately thereafter.

• If there were no manpower constraints, the yearly cycle of case finding and treatment of cases would be carried out in all endemic municipalities and barangays.

• In the non-endemic *barangays* and in the endemic *barangays* not being covered in a particular year, there would be voluntary submission of stools by the residents or barangay leaders. This would be treated as routine stool examination (SCS Annual Report 1988).

Program objectives

The overall objective of the program is to reduce infection and morbidity due to schistosomiasis to such levels that the disease ceases to be a major public health problem. The specific objectives, as stated in the 1985 Annual Report, are:

• To control schistosomiasis through mass stool examination of the population and treatment of all cases:

for priority provinces — to reduce the prevalence rate by 60 percent at the end of 1986.

for non-priority provinces — to reduce the prevalence rate by 35 percent at the end of 1986.

• To intensify the health education campaign and promote awareness of the disease problem,

• To intensify environmental sanitation and encourage the use of toilets.

More recently, the Schistosomiasis Control Service (SCS) has organized an annual workshop for schistosomiasis control coordinators of all the endemic regions and provinces. This is a regular forum for the coordinators to report on the status of the program in their provinces, and to share with other coordinators and Central Office personnel the problems encountered in their areas and how they are trying to cope with difficulties. During these meetings, operational strategies for the following year are discussed and a consensus is reached on the scope of coverage and targets for case finding and treatment.

For instance, for 1988, it was agreed that case-finding efforts should cover 50 percent of the endemic municipalities, with a target of 100 percent stool submission rate among the population aged one year and above. Each of the endemic municipalities then projected their targets through the use of a standard arithmetical formula provided for this purpose by the Central Office.

Since estimates of the projected population of the municipality or province are supplied by the Central Office, the task of target setting is reduced to a computational exercise using the given formula and the correct numbers. While the process of formulating strategy does start with an assumption of scarcity of resources, the actual level of resource scarcity in different provinces and under local geographical conditions does not form part of the decision-making process. Reaching 50 percent of target is the acceptable minimum performance. The projected number of positive cases in each area serves as the basis for determining the quantity of drugs supplied to each area.

Some coordinators in Leyte feel that a target of 50 percent coverage is too high, given the size of the exposed population and the limited resources allotted to schistosomiasis control in their area. Other coordinators seem to welcome the use of the standard formula. [A municipal health officer in Leyte appreciated the practice of simply asking the rural health unit (RHU) staff to use a set formula to arrive at the targets since he claims that his RHU staff are not conversant with the intricacies of target setting.]

Thus, the process of target setting is essentially a consensual process, with the specific targets decided by the regional and provincial program coordinators as a group, based on the Central Office's stratification strategy that seeks optimum use of limited resources. Target setting at the municipal level is essentially a matter of working with a set of figures and a set formula. Objective setting is not correlated with: (a) the actual resources allotted to the area; (b) the road and transport conditions that affect staff mobility; and (c) other geographical features of the area that may mean longer travel time for the schis-tosomiasis control teams or for staff of the rural health units or *barangay* health stations.

Program organization

Organizational evolution

Evolution of the organizational structure for the national schistosomiasis control program has generally reflected major institutional changes in the Department of Health. Three stages can be identified. The first stage (1949-52) consisted of research-oriented pilot activities which provided the empirical basis for formulating a national control strategy. Then came the "vertical program" stage (1961-82) which saw the fielding of schistosomiasis control teams into endemic provinces from the Central Office.

The program's support infrastructure during this second period not only included a full administrative staff, but also functioned under a National Schistosomiasis Control Commission that formulated the program and ensured that the DOH control strategy was functionally linked with rural development and water projects of other government agencies. Later, the coordination and implementation functions were separated. The coordination function became the sole concern of the Schistosomiasis Control Council, which was attached to but not under the DOH's immediate supervision, while the tasks of designing and implementing the control program became the responsibility of the DOH's Schistosomiasis Control and Research Service.

The third and currently ongoing "integrated program" phase of the program (1982-present) marked the end of the vertical program phase. The Department of Health, based on a presidential executive order (no. 115) issued in 1982, carried out a department-wide reorganization which integrated public health and medical services at the provincial level, and transferred responsibility for implementing health programs to the regional and provincial health offices. The Schistosomiasis Control and Research Service ceased to oversee field activities of the program and was instead converted into a staff office whose main task was to provide technical advice to units operating in the field.

Throughout these periods of major change, the original Leyte-based Schistosomiasis Control Pilot Project — which currently serves as the program's research and training arm — has proved to be the most enduring part of the program. It has withstood the reorganization-triggered changes, and has provided a strong research orientation and an openness to new developments in formulating the national program's control strategy.

Central organization

When the Aquino Administration took office in 1986, another reorganization was undertaken in all government agencies. Executive Order no. 119, issued in January 1987, formed the legal basis for the new structure of the DOH. The organizational reforms introduced were basically supportive of the integration and decentralization implemented through the earlier Executive Order no. 851 of 1982 (see the Annex for details).

The Schistosomiasis Control Council was abolished and its functions were absorbed by the SCS. The SCS reports to the office of the under secretary for public health services who is responsible for several staff units that provide technical services to the public health programs implemented by the DOH's field offices.

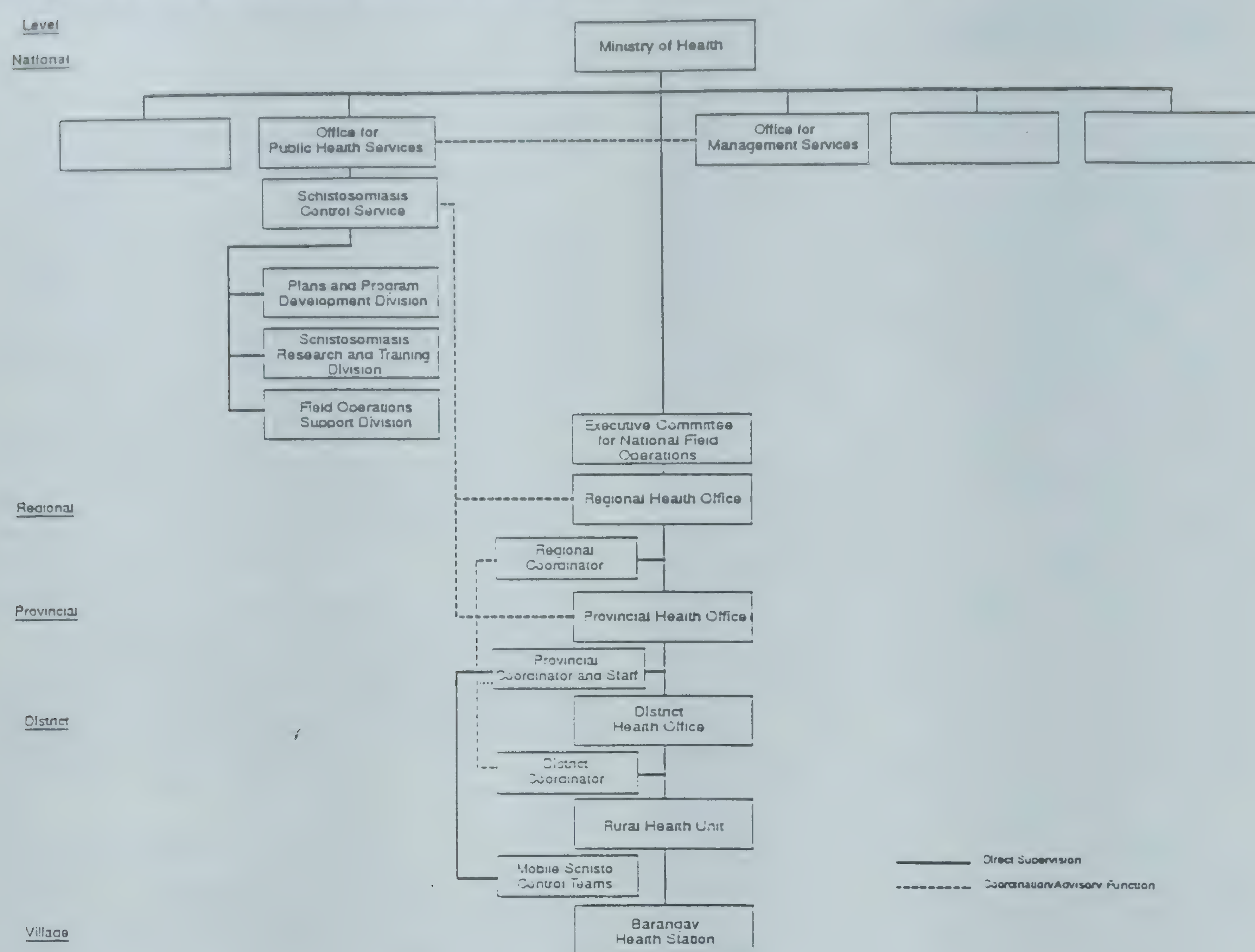
Except for these changes, the basic structure for program implementation, as provided under Executive Order no. 851, has been maintained. Three key components presently constitute the program's national structure: (a) the Schistosomiasis Control Service, a staff office within DOH at the national level; (b) the various regional and provincial health offices, which are principally responsible for carrying out the program's control strategy in their respective areas; and (c) the provincial schistosomiasis deployed from the integrated provincial health offices.

Figure 5.1 (overleaf) depicts the staff and line relationships among these component units. The SCS provides technical support to the field offices — primarily the regional and provincial health offices and the program coordinators at these levels. These offices exercise direct administrative and technical supervision over the programs implemented in the field.

The SCS, as a staff unit, is expected to perform the following six functions:

- Formulate plans, policies, guidelines, and standards for the implementation, monitoring, and evaluation of the national schistosomiasis control program.
- Provide training and technical support to field personnel involved in epidemiologic, diagnostic, and control activities on schistosomiasis.
- Initiate, coordinate, or conduct further research on schistosomiasis that would lead to more

Figure 5.1 Organizational structure of the schistosomiasis control program



effective and economical methods of controlling the disease.

• Consolidate and evaluate relevant data on schistosomiasis collected from the provincial and regional offices.

• Extend medical and advisory services to cases referred by physicians or hospitals.

• Facilitate procurement and provision of the required drugs, laboratory supplies, and IEC material, respectively for schistosomiasis case-finding, treatment and health education.

To carry out these functions, the SCS has three divisions: plans and programs development; research and training; and field operations support. The Research and Training division is located in Palo, Leyte where it maintains research laboratories and a medical zoology section. Over the years, the SCS has delegated control of the program to the regions and provinces and has relinquished control over the schistosomiasis hospital in Leyte. Its total staff in the Central Office has been reduced from 130 in 1984 to 79 in 1988.

Field offices

Since 1982, line responsibility for DOH programs has been delegated to regional and provincial health offices. Schistosomiasis control teams, which were formerly under the SCS, now report to the integrated provincial health offices. As the highest "field office" overseeing and supporting program implementation, each regional health office is responsible for: (a) providing overall leadership and direction for the successful implementation of the control program, ensuring coordination with other government agencies at the regional level; (b) approving implementation plans, programs, and policies recommended by the provincial health officer; (c) providing a schistosomiasis control coordinator who plans, monitors, and assesses the program at the regional level; and (d) submitting consolidated reports to the secretary of health.

The regional schistosomiasis control coordinator, who is a staff member of the region's technical

services division, provides technical assistance to, and monitors the progress of, each province's schistosomiasis control program. The coordinator also serves as a relay point for the dissemination of guidelines formulated at the Central Office as well as for the collection of regular reports from the field offices.

The integrated provincial health office, which has responsibility for field operations of all the vertical programs being undertaken by the DOH, and where complete integration of all components of the health care delivery system is to be expected, has a key role in implementing the schistosomiasis control program in the field. It is responsible for: (a) preparing plans for schis-tosomiasis control in the province; (b) exercising supervision and control over the district health office for program implementation; (c) providing administrative and logistical support for the program; (d) deploying additional personnel, e.g. malacologists, medical technologists, technicians, laboratory aides, and others as part of the mobile schistosomiasis control teams to districts/municipalities as necessary; (e) coordinating with other agencies to ensure successful program implementation at the provincial level; and (f) monitoring and assessing program performance and submitting consolidated reports to the regional health office.

A provincial schistosomiasis coordinator is designated in endemic provinces. This coordinator, who is usually a member of the technical services unit of the provincial health office, is responsible for supervising the case-finding, treatment and malacological surveys of RHUs in endemic municipalities. The coordinator also supervises deployment of the provincial schistosomiasis control team to various municipalities, depending on the prevalence rate or the performance of the RHU *vis-à-vis* its case-finding or treatment targets.

At the next lower level, the district health office is responsible for: (a) supervising the RHUs as they carry out specific tasks for the program; (b) participating in the formulation of plans, programs, and policies, and directing and evaluating the program — through the district health officer who attends regular conferences with the integrated provincial health office; (c) supervising the case-finding and treatment activities of the resident physicians, municipal health officers, and public health nurses; (d) providing administrative and logistical support for the RHUs' case detection, treatment and malacological survey activities; and (e) submitting monthly consolidated reports from the RHUs to the provincial office.

The "frontline" of the program's service delivery mechanism is the RHU. At this level, community residents receive the services or participate in case-finding and treatment activities of the program. Most program activities are undertaken at this level, and include: (a) the necessary preliminary activities, such as social preparation and health education (particularly for case-finding), treatment of cases, environmental sanitation and malacological surveys; (b) scheduling case-finding and treatment sessions in the different endemic *barangays*; (c) mobilizing the *barangay* health workers and other *barangay* organizations for stool collection; (d) undertaking case-finding and treatment in the area; (e) conducting the semi-annual or annual malacological surveys utilizing malacological personnel; (f) recommending to the chief of the district hospital any changes needed in program implementation strategy; (g) coordinating with other agencies to obtain their support for various aspects of schistosomiasis control; and (h) preparing and submitting on time monthly program reports to the district health officer.

The *barangay* health station, a satellite of the RHU, is expected to: (a) assist RHU personnel in preparing the community for schistosomiasis control activities; (b) facilitate stool collection and submission by *barangay* health workers to the integrated microscopy centers, and motivate positive cases to submit for treatment; and (c) recommend to the RHU alternative strategies to improve stool collection and facilitate treatment of cases.

Schistosomiasis control in Leyte

Organization and staffing

Schistosomiasis control efforts in endemic provinces have the program structure described above. However, just as conditions and resources vary by endemic area, the program structure can slightly differ from one province to another. An assessment of how the program is structured and implemented in Leyte is given below.[1] Leyte's schistosomiasis prevalence rate is among the highest in the country, and it is also the site of the Schistosomiasis

1. The province of Leyte, with a land area of 5,146 square kilometers, is the biggest of the six provinces of Region VIII. It is composed of 41 municipalities and two cities. In 1988, it had a population of over 1.13 million (or 35 percent of the population of Region VIII).

Research and Training Center where most of the national research on schistosomiasis is done. The center is one of the divisions of the SCS based in Manila.

At the regional level, Leyte has a position for a schistosomiasis regional coordinator. However, since the previous incumbent has been promoted to a higher position in the SCS in Manila, the regional coordinator for malaria and filariasis has been doubling up as a schistosomiasis regional coordinator since 1988. He therefore has very limited time for technical supervision of any of the three programs. Also, his assignment as regional coordinator for schistosomiasis control is temporary; he expects that a new coordinator will soon be appointed so that greater time could be devoted to supervision.

At the provincial level, a physician who holds the position of medical parasitologist serves as the provincial schistosomiasis coordinator. During her maternity leave, no one was formally designated to assume her position. As provincial coordinator, she is responsible for technical and administrative functions, such as rotation of the schistosomiasis control team among different municipalities and determination of strategies appropriate to local conditions. She noted that since most members of the provincial schistosomiasis control team were formerly with the Schistosomiasis Control and Research Service, and were well aware of the technical aspects of their job, she did not have to supervise them very closely.

The schistosomiasis coordinator at the district level is the public health nurse for Abuyog, the area where the district hospital is located. (Abuyog has some *barangays* endemic for schistosomiasis.) She too is a part-time schistosomiasis coordinator. As coordinator, her main responsibility is to collect and consolidate reports coming from the four municipalities within the district catchment area. In other districts, the rural sanitary inspector also serves as the district schistosomiasis coordinator.

The provincial schistosomiasis control team deployed to the different municipalities usually consists of four or five people — a malacologist, a draftsman, a schistosomiasis laboratory helper, and a medical technologist. These teams are not permanently assigned to a municipality. They are rotated, depending on the prevalence rate in various areas of the province. Since these teams were earlier reporting directly to Schistosomiasis Control and Research Service, they are still adjusting to the new administrative arrangements under which they have to report to the municipal health officer at the RHU. While this problem was more pronounced before, the team is gradually beginning to work with the RHU staff. For the duration of the team's assignment to an RHU, the municipal health officer signs its time sheets and travel expense vouchers.

Summarizing, the current manpower availability for supervising the schistosomiasis control program at the regional and district levels in Leyte leaves much to be desired. The lack of full-time schistosomiasis coordinators at various levels precludes the provision of technical or administrative inputs required by lower-level field units. The heavy workload of personnel with "additional" assignments can result in their giving minimal attention to program activities because of competing claims on their time.

Program resources

To successfully accomplish its objectives, a program must have adequate resources — especially funds and personnel. Particularly for case-finding in schistosomiasis, the supply of microscopes and microscopists is crucial to the control strategy adopted in the Philippines.

The main source of funds for the schistosomiasis control program is the budgetary appropriation for the DOH. In some areas, the IBRD- and ADB-assisted projects which involve the construction and/or rehabilitation of irrigation canals also provide funds. While the total amount of money provided by the Philippines Government is easier to determine, the foreign assistance for schistosomiasis control components in the various endemic provinces is not immediately available.

In 1987, the approved appropriation for the schistosomiasis control program was about 14.6 million pesos, which was small (0.35 percent) in relation to the national health budget. Over the four-year period 1984-87, appropriations for the program have tended to follow an erratic pattern — rising in 1985, dropping by almost one-fourth in 1986, and increasing substantially in 1987. On average, however, the appropriation for the program has been less than 0.5 percent of the national health budget.

The total number of personnel involved in schistosomiasis control is more difficult to estimate as this requires accurate data on staff of the central and field offices devoting time to schistosomiasis control work. However, at the Central Office of

the SCS, the number of personnel has gradually decreased (see Table 5.1).

This decrease is understandable because more program tasks and responsibilities have been delegated to the field offices. However, hard data on the size of the schistosomiasis control teams at the provincial level are difficult to obtain because they require detailed information on DOH personnel in the 24 endemic provinces. In the case of Leyte, official records show that there are 18 full-time staff engaged in schistosomiasis control, organized into four teams of four or five members each, working in various municipalities of the province. With three to five additional staff based at the integrated provincial health office, the total number of provincial personnel doing schistosomiasis control work may add up to 23. However, the grand total of schistosomiasis program personnel in Leyte is difficult to estimate, because it requires information on the staff at regional, provincial, district, RHU, and *barangay* levels assigned full- or part-time to the program.

A crucial task in schistosomiasis case-finding is the examination of stools. This requires a stool specimen, a microscope, and a trained microscopist to examine the specimen. Of the 1,937 RHUs in the country, 1,239 or 63 percent are organized as microscopy centers (1988 figures). Data on microscopists indicate that there were 2,048 in 1988. Of this number, 42 percent were medical technologists, while more than half were not. The nonmedical technicians were nurses and midwives who were given special training in the use of microscopes. Since the total includes microscopists assigned to hospitals, the actual number of microscopists working in the RHU-based microscopy centers is quite low.

With only 80 percent of the microscopes estimated to be usable (1988 estimates), the regional ratio of functional microscopes to population ranges from a low of one microscope for 135,025 population in the national capital region to a high of one to 26,856 for Region X. The scarcity of microscopes for schistosomiasis is further compounded by the fact that microscopy centers are also utilized for other control programs such as malaria and TB. Furthermore, besides microscopes, schistosomiasis control personnel also need vehicles, especially for visiting remote and inaccessible areas. Due to the inadequacy of public transportation in rural areas, field personnel consider the lack of transport a major problem, both for service delivery and program monitoring and supervision.

Table 5.1 Central office staff of Schistosomiasis Control Service (1984-88)

Year	*Staff*
1984	130
1985	118
1986	118
1987	78
1988	79

Service delivery

The package of services to be delivered depends largely on the control strategy adopted. In the Philippines, the program strategy stresses morbidity control through case-finding and treatment, supplemented by health education to promote awareness. Depending on availability of funds — a condition best satisfied in foreign-assisted projects — snail control and environmental sanitation are also undertaken.

The primary field activities undertaken in the Philippines control program are: (a) determination of who among community members are positive for schistosomiasis; (b) treatment of those found positive; and (c) health education to promote greater awareness of preventive and curative measures that could be undertaken.

As noted earlier, the RHU, with the assistance of its *barangay* health stations, is the program's frontline service center. It is here that the public can seek assistance as walk-in patients who bring their stool samples for examination or can request treatment. For active case-finding, the barangay health workers or midwives distribute stool cups to encourage community members to submit stools for examination at the RHU. It is also from the RHUs that health education campaigns are initiated.

These services are provided free. Administrative and technical support from the higher program offices is ultimately reflected in the adequacy of services delivered at the RHU level. The quality and quantity of these services, and the manner in which they are provided, is directly related to the adequacy and timeliness of resources and the physical condition of the RHU.

With regard to personnel, the three staff actively involved in case-finding are the *barangay* health worker, the rural health midwife, and the microscopist. For treatment, the rural health nurse and the municipal health officer assume greater responsibility.

The *barangay* health workers' main responsibility in schistosomiasis control is to assist the midwife in filling the family index cards in each endemic *barangay*. For case detection, village workers help in distributing stool cups, preparing the stool specimen for examination, and keeping people informed of the treatment schedule. Since patients being treated must stay in the RHU for practically the whole day for observation of possible reactions to the drug (which is given in two doses with an interval of four hours), patients are encouraged to bring their lunch or snacks which they can take while they are under observation by the RHU staff.

The rural health midwife prepares the community for case-finding and treatment of cases. She undertakes a family survey using the family index cards, and enters the records of those examined and found positive on these cards. She also informs the community of the treatment schedule either at the RHU or at the *barangay* if the RHU team has decided to visit the *barangays*.

The microscopist, who is either a member of the mobile team or a resident medical technologist at the RHU, receives the cups containing stool specimens, examines these, and records the results of the examination. She reports the results to the municipal health officer and to the chief district officer so that the individual patients can be informed as to when they may come for treatment. The medical technologist covers one endemic *barangay* in a municipality at a time, deciding on the village to be served after consulting with the municipal health officer.

For treatment, the public health nurse and the municipal health officer are directly involved. Besides supervising the activities of the midwife, and assisting the microscopist in formulating a plan for case-finding and treatment of cases, the nurse may treat positive cases in early stages of the disease. However, she is required to refer patients with severe side reactions to the municipal health officer or hospital or to stop medications; and there are cases she is not expected to deal with — namely those with hepato-splenomegaly, cerebral cases, malnourished patients, and pregnant mothers.

The municipal health officer is responsible for preparing a plan of action for undertaking schistosomiasis control activities in his municipality. He schedules the provision of treatment in endemic *barangays* and ensures that treatment is given immediately after the patient is found to be positive. Treatment is given in two divided doses, with an interval of four to six hours (Blas 1988:153).

In the case study area, the RHU (in MacArthur, Leyte) has designated Friday of each week as its schistosomiasis treatment day. Since this practice is fairly well institutionalized in the RHU, patients can come ready to stay for the whole day for treatment. Usually, patients inquire about the results of a stool examination on the preceding Thursday so that they can come for treatment the following day.

The primary health care committee is helpful for information dissemination, but not for stool collection as they sometimes "forget" the stool cups in their areas. Changes in leadership of the committees also affect their effectiveness.

One health education technique which the MacArthur staff has found useful is to schedule video shows of action films at the RHU on Fridays. They briefly interrupt the showing of the action film at crucial points and present tapes on schistosomiasis. The effectiveness of such information dissemination is confirmed by the schistosomiasis provincial coordinator. However, Region VIII has one audio van for the three (schistosomiasis, malaria, and TB) disease control programs. In 1982, the schistosomiasis program was on the priority list; in 1988, however, this was no longer the case. Program staff used to have access to radio programs also, but this is not possible anymore because it is rather expensive.

With regard to delivery of control services in MacArthur, the RHU has no resident microscopist, so the provincial schistosomiasis team examines the stool specimens. Although the schistosomiasis control team reports to the municipal health officer, it has been temporarily assigned to MacArthur until it completes the surveys and examination in the area.

For the duration of their assignment to this municipality and to other areas, members of the provincial schistosomiasis control team are entitled to claim actual and necessary expenses and per diem not exceeding 400 per month if they meet their corresponding work quota. These work quotas are as follows: (a) malacologist — survey at least five snail colonies and one community per month; and (b) technician — examine 625 slides per month. If these staff members are unable to meet the requirements, their travel expense vouchers are adjusted on a pro-rata basis.

Prior to integration, members of the schistosomiasis team focused on just one specific task; now a malacological survey team has to do stool collection. Thus, the service delivery

mechanism of the RHU in MacArthur is quite dependent on the provincial schistosomiasis control team, which is temporarily fielded in the municipality because of the high prevalence rate of schistosomiasis. After the necessary examination and malacological surveys have been completed, this team will be rotated to other towns. By then, hopefully, the prevalence rate in the area will have been reduced considerably.

Community interactions

As noted earlier, schistosomiasis is endemic mostly in rural areas, and infection rates are highest among farmers. This makes the clientele of the program fairly homogeneous by area and type of work. Preparation of an informational and educational campaign geared to a well-defined clientele whose life style and preferences are known is much easier. The difficulty in schistosomiasis control is that the people at risk are continually exposed to reinfection because of the nature of their work. Farmers are caught in the difficult position of having to choose between further exposure to the disease or forgoing their chances of earning a living. Considering that they have little or no choice of livelihood, it is understandable why most of them risk reinfection rather than leave their farms.

A survey in 1985 sought the perceptions of infected and noninfected individuals on the potential consequences of schistosomiasis. It revealed that the respondents were aware of the potentially adverse consequences of schistosomiasis for individuals and their households. There was high degree of agreement (70 percent or more) among respondents that schistosomiasis adversely affects productivity — in terms of level of effort, pace of work, and work days lost — and that infection of the household heads can seriously affect household income and material welfare. (Herrin and Rosenfield 1988:228-229). The survey also showed, however, that almost all infected respondents perceived a lesser impact than non-infected respondents.

The communities' perception of economic implications of the disease are also valuable in understanding their willingness to cooperate in case-finding and treatment, especially if they have little choice of avoiding exposure to the disease because of the very nature of their work. If they know that they can be treated after reinfection and that the cure is fairly effective and with no serious side effects, then the community can be more supportive of the program's case-finding and treatment campaign.

A knowledge, attitude, and practice survey in some endemic *barangays* in Leyte showed that stool submission was significantly lower among the younger age group, single or widowed individuals, and those without formal education. Some of the reasons commonly cited for non-submission were: absence of a schistosomiasis-related symptom (21.4 percent); not around during the stool collection (18.9 percent); unaware of ongoing survey (18.9 percent); and higher priority given to work (13.6 percent). However, a follow-up survey after control measures had been adopted showed an increase in stool collection rate of 28 percent (to 52.5 percent). Health education also resulted in an increase in the stool submission rate. (SCS, Annual Report, 1988: 18). Overall, however, the difficulty of collecting stool specimens for examination remains the main problem in case-finding.

Supervision

Supervision of program activities by different management levels is done through supervisory visits, regular staff meetings and area conferences, and review of written reports. The program structure makes a distinction between administrative supervision (by the chief of a field office) and the technical function performed by the Central Office (whose suggestions are not binding on field units).

As a national-level staff office, the SCS provides purely advisory services to the various field offices; but it is also responsible for the training and research functions of the program. Hence, SCS staff's visits to the field are to some extent monitoring visits, to verify whether the program is being implemented as per established guidelines. The four-page SCS monitoring checklist covers the availability of work plans, administrative requirements of the program, resources needed and received, technical reports still to be submitted, and the status of the microscopy centers within the area.

Supplementing these visits, the SCS periodically holds national conferences for regional directors, provincial health officers, and regional and provincial coordinators to discuss how the various regions and provinces are implementing the program. During these conferences, schistosomiasis control personnel reflect on their experiences and suggest possible reformulation of program strategies for achieving greater effectiveness in the coming years. These national

conferences were sponsored by WHO in 1983, 1986, and 1988, and provided a useful forum for learning and professional reinforcement.

At the regional level, program activities are supervised by the regional coordinators through supervisory visits and meetings with provincial coordinators. The regional coordinators also convey program guidelines and communications from the central office to the provinces; and relay reports from the field units to headquarters. For preparing and consolidating program plans for the region, the regional coordinators organize meetings of the provincial coordinators.

As noted earlier, in Region VIII (where Leyte is located), the regional coordinator for malaria and filariasis has been doubling up as schistosomiasis coordinator since 1988. Having to attend to three control programs reduces the coordinator's time for effective technical supervision.

In Leyte, a physician is the medical parasitologist and has also been the provincial coordinator since 1987. While she considers the relationships between the province, district, and the RHU to be satisfactory, some members of the provincial schistosomiasis control team from the SCS do not fully accept the DOH's integrated approach, perhaps because they had earlier worked for the vertical program and have stronger ties with Schistosomiasis Control and Research Service personnel.

Furthermore, the marked disparity between the conditions of work under the earlier World Bank-assisted project and in the current Government-funded program is another source of low morale. The foreign project provided more flexibility because of its greater resources. Professional growth was facilitated by opportunities for foreign training and interaction with experienced specialists in schistosomiasis control. The present acute scarcity of resources, lack of transport and equipment (such as dissecting microscopes), and unclear prospects for career development are other demotivating factors.

In Leyte, while the regional coordinator does not regularly visit the province, the (national) Central Office staff do visit the provinces for about three days every quarter. Within the province, the provincial health office schedules a monthly meeting for each district's RHU staff. In this big meeting, each municipal health officer or nurse presents his/her accomplishments, by program. Municipalities in the district are ranked according to their performance by program; and the districts are ranked on the basis of their overall accomplishments. Participants at the meeting collectively analyze the data and suggest solutions for problems faced by individual programs.

The district coordinator for schistosomiasis consolidates the monthly reports received from various municipalities. These reports include the numbers of cases treated and the positive cases. Similar consolidation is done at the other administrative levels. However, data from the RHUs are sometimes delayed due to such reasons as lack of forms or paper and the large volume of work at the RHU. The district coordinator then has to personally go to the municipality to obtain the necessary data.

Thus, in Leyte, the supervisory capability in the field is constrained by: (a) the inadequacy of technical supervision at the regional and district levels; and (b) limited mobility of coordinators due to lack of government vehicles and public transportation in the area. Despite these limitations, the provincial health officer tries to use the monthly conferences to enable the RHU staff to report their accomplishments and discuss their problems and possible solutions.

Overall, with the vertical decentralization within the DOH and the creation of the district health offices, another level of supervision over the RHUs was introduced. While the reduction in physical distance between the RHUs and their supervisors in the district office is advantageous, the lack of adequate personnel negates this benefit.

Monitoring

In principle, "supervision" means determining whether tasks and functions are being performed according to technical and administrative guidelines, while "monitoring" means assessing how well program objectives and targets are being met. A good monitoring system provides clear assessments of program performance at regular intervals, and generates data for making adjustments in strategy in light of resources available.

In Leyte, the formal system for monitoring schistosomiasis control consists of a series of periodic reports from the RHUs to the Central Office, via the district, provincial, and regional offices where the data are progressively aggregated or consolidated. The main reports are listed in Table 5.2.

In addition, data are collected on snails, using various forms: malacological form no. 1 is a summary sheet which gives the location, date of sampling and description of the colony; a second

Table 5.2 Main monitoring reports from rural health units to the Central Office

Report number	*Data provided*	*Frequency*	*Responsibility*
1	Examination and Treatment Report (population examined, number found positive, and number treated)	Monthly	RHU (municipality, classified by *barangay*)
2	Examination and Treatment Report (classified by province; population examined, number found positive, and number treated)	Monthly	Integrated provincial health office
3	Drug Utilization Inventory Report (amounts of praziquantel received, date received/previous balance/issued to patients)	Quarterly	Integrated provincial health office
4	Health Education Report (community assembly held, IEC materials received and distributed)	Annual	RHU (municipality)
5	Environmental Sanitation Report	Annual	RHU (municipality)
6	Inventory of Manpower/ Equipment in schistosomiasis endemic municipalities	Annual	Integrated provincial health office
7	Report of Financial Operations (allotment and actual disbursement)	Semi-annual	Integrated provincial health office

Source: Blas 1988:169-95.

form, prepared by municipality, identifies the *barangay* where the snail colony is, the latter area, snail density, and infection rate, and estimated snail population; rechecking of snail colonies is reported on form 3; and agro-engineering snail control and molluscicidіng activities on forms 4 and 5, respectively.

The pressure to submit reports on time has increased in some areas because of the practice of withholding salaries of personnel who do not meet report deadlines. The volume of work, lack of forms, and the anxiety of having to suffer a delay in getting one's pay is sometimes such that for some staff the submission of reports has become an end in itself.

The consistency and accuracy of data and their analysis are problematic. In Leyte, the trend in prevalence rate is inconsistently reported in the annual reports of the provincial, regional, and central offices. In 1988, while the Central Office's annual report reported a prevalence rate of 5.7 percent, the provincial and the regional reports indicated 9.0 percent. This discrepancy may be due to the difference in the figures used for computing the total number of cases examined. Such statistical inconsistencies are relatively easy to correct; but until such corrections are made, the data-base for assessing program performance remains weak.

Program performance

Table 5.3 (overleaf) indicates that since the advent and use of praziquantel in the early 1980s, the prevalence rate has dropped from a five-year average of 10.4 percent for 1981-85 to 6.6 percent in 1987. The number of cases treated has increased by 13.7 percent between 1986 and 1987.

The substantial drop in prevalence rate is primarily due to the much better performance of control activities in foreign-assisted projects. Table 5.4 (overleaf) shows that foreign-assisted projects provide more IEC materials, water-sealed toilets, water pumps, and concrete footbridges, etc.

The experience of Leyte, whose IBRD-assisted project was completed in 1985, may be indicative of the problems of schistosomiasis control without foreign funding. Soon after termination of the

Table 5.3 Treatment of cases with praziquantel and prevalence rates, 1981-85, 1986, and 1987
(foreign-assisted and locally funded projects)

Years	Number examined	Number positive	Percentage positive	Number treated	Percentage treated
1981-85	1,817,594	189,065	10.4	123,458	65.3
1986	459,291	34,150	7.4	25,051	73.4
1987	683,918	44,925	6.6	39,121	87.1

Source: Blas 1988:25-6.

Table 5.4 Summary of accomplishments of the health education and environmental sanitation campaigns 1980-87
(foreign-assisted and locally-funded projects)

	Foreign assisted		Locally funded		Total	
Particulars	Number	Percentage	Number	Percentage	Number	Percentage
Health education campaign						
Seminars/workshops	666	91	63	9	729	100
Lectures/demonstrations	60,824	70	25,868	30	86,692	100
Persons reached	893,171	55	722,154	45	1,615,325	100
IEC materials distributed	258,463	91	25,759	9	284,222	100
Environmental sanitation campaign						
Water-sealed toilets distributed	58,019	61	37,557	39	95,576	100
Pumps installed	1,833	100	1,833	100		
Concrete footbridges built*	241	100	0	0	241	100

* In Leyte only.
Source: Blas and others 1988:23-4.

foreign assistance in 1985, the project's level of accomplishments dropped rather sharply — but picked up eventually in 1988 as shown in Table 5.5. The increase in accomplishment levels may also be due to adjustments in the targets themselves. Table 5.6 lists the number of cases examined, found positive, and treated, listed separately for foreign-assisted and locally-funded projects.

Highlights and lessons

Persistent Problems

Five major categories of persistent problems can be identified from the annual reports of the SCS (and its predecessor, the Schistosomiasis Control and Research Service). These are: (a) resource constraints; (b) integration difficulties; (c) supervisory needs; (d) community support and participation; and (e) external factors.

"Resource constraints" refers to the acute shortage of logistical support for the program's field operations. As is true for the Philippines' public health system in general, the schistosomiasis control program suffers from a lack of resources — men, money and materials. Field personnel are adversely affected by the lack or absence of: transport, office or laboratory facilities, praziquantel or other drugs, supplies and equipment, IEC materials and — more importantly — appropriately trained personnel (especially microscopists).

"Integration" difficulties — which continue to affect the schistosomiasis control team and the general health services personnel some five years after the Schistosomiasis Control and Research Service personnel were "absorbed" into provincial offices — strongly suggest that administrators still need to iron out "phasing-in" difficulties, both for the general health services personnel and the mobile schistosomiasis control teams. Concrete manifestations of these difficulties include: (a) the feeling that the newly integrated personnel have lost control over resources, e.g. over vehicles which were earlier exclusively available for schistosomiasis activities; and (b) a communication gap between schistosomiasis staff and per-

Table 5.5 Accomplishment report for the province of Leyte: 1984, 1985, 1986, and 1988

Year and activity	Target number	Accomplishment Number	Accomplishment Percentage
1984			
Examinations	163,000	143,252	87.88
Positive cases		18,309	12.78
Positive cases treated		5,594	30.55
1985			
Examinations	210,755	113,799	54.00
Positive cases		10,192	8.95
Positive cases treated			77.28
1986			
Examinations	212,938	86,554	40.65
Positive cases			
Positive cases treated	8,583	5,597	65.21
1988			
Examinations	108,381	90,693	83.86
Positive cases	9,953		10.97
Positive cases treated	8,738		87.8

Note: Data for 1987 is not available
Source: Province of Leyte, Annual Report, 1988.

Table 5.6 Treatment of cases with praziquantel and prevalence rates,1981-1985, 1986, and 1987
(Foreign assisted and locally funded projects)

	Number examined					Number positive				
	Foreign assisted		Locally funded			Foreign assisted		Locally funded		
Years	Number	Percentage	Number	Percentage	Total	Number	Percentage	Number	Percentage	Total
1981-85	1,511,334	83	306,260	17	1,817,594	162,976	86	26,089	14	189,065
1986	373,576	81	85,715	19	459,291	26,218	77	7,932	23	34,150
1987	317,081	46	366,837	54	683,918	13,712	30	31,219	70	44,925

Source: Blas and others 1988: 25-6.

sonnel of the integrated system. Related to this issue, but not directly a function of integration alone, is the apparent lack of mutual respect and cooperation among some team members.

The third category, "supervisory needs," refers to the need for more supportive supervision. Field staff would like to have much greater interaction with technical staff from the central and regional offices in order to lessen their sense of isolation. They would also like more support from their immediate supervisors, particularly the provincial health office, to minimize demotivation which can easily lead to diminished output.

The fourth problem area relates to the people's awareness of and active support for program activities. Realizing that health education is the key to getting community support, the field staff are demanding more radio broadcasts and audio-visual facilities for film shows (the community prefers the latter). There is also the perception that improved rapport with the local mayor and *barangay* captain could help generate community participation, and could also provide a conduit for conveying feedback to the community.

Included under "external factors" are deterrents to program effectiveness that lie beyond the scope of program management. These include peace and order problems in certain areas or unpredictable weather conditions which upset work schedules. Also, there are difficulties of maintaining linkages with other government agencies and in obtaining political support from local govern-

ment officials, such as governors and town mayors of endemic areas.

Highlights and lessons

The case study highlights the following aspects and lessons of the Philippines schistosomiasis control program. First, the program's control strategy shifted from a preventive approach focused on stopping transmission to one of morbidity control because of: (a) a technological breakthrough which resulted in the production of an effective drug (praziquantel) for reducing morbidity; and (b) the prohibitive cost of agro-engineering interventions aimed at curtailing snail colonies.

Second, cost considerations and technological innovations crucially influenced the government's decisions on control strategy, as well as the structure and mechanisms through which the strategy was translated into a program of action. Program organization and management were also affected by national and international developments which tended to favor the use of simpler technology, greater citizen participation, strengthening of general health services through integration, and more substantial decentralization. As a result, just when the control program was beginning to use praziquantel more extensively (in 1982), the DOH introduced major organizational reforms — primarily integrating the control program with primary health care efforts and shifting responsibility for program implementation to field offices. At present, the program's organizational structure seems to be determined mainly by considerations other than the particular needs of schistosomiasis control. In fact, there is really no separate program structure for schistosomiasis, because the program is undertaken through the existing DOH structure and mechanisms for formulating and implementing all public health programs.

Third, as one of the many programs delivered through the general health services infrastructure, the schistosomiasis control program inevitably faces the same constraints that beset the whole system (primarily, the scarcity of resources, which is manifested in inadequate manpower and poor support services and related logistics). This is why foreign-assisted projects, which had more resources, achieved better results in terms of lower prevalence rates.

Fourth, the marked distinction between "staff" and "line" functions in the DOH parallels the common distinction between planners and implementors of programs. The Central Office staff issue planning guidelines and determine national objectives and targets. These are translated by each field office into local targets using formulas and population projections provided by the Central Office. There is an attempt to plan with the provincial health office and the regional and field coordinators as a group; and field-level meetings provide an opportunity to explain how local plans will be formulated in view of the strategies and guidelines adopted at national conferences and workshops.

Fifth, the staff of the Central Office, in providing technical guidelines for the delivery of services, have attempted to make things simpler for overburdened field personnel at the RHU level. This has had both positive and negative consequences. "Simplification" has facilitated decision-making at the lower levels; but requirements seem to have been so simplified and routinized that they deter lower-level administrators (like municipal health officers) from focusing on more-substantive aspects of program delivery. For example, timely submission of reports is constantly emphasized; but given the volume of work of the RHU staff, they seem so preoccupied with submitting the reports that they often neglect to understand the epidemiologic implications of the data collected at the RHU level. This could be a crucial omission, especially in highly endemic areas.

Sixth, it is not meaningful to talk of the program's management structure and processes, since there is really no separate program to speak of. When one speaks of "program" management for schistosomiasis, one really refers to the management system that operates in the DOH. Although there is a separate program for the control of the disease, the separate identity of the program has been lost (except for coordinators at specific levels). While the municipal health officer is in effect the front-line program manager, the provincial health office is the level where crucial decisions — that could deviate from the national technical guidelines (if local conditions so warranted) — are made.

Seventh, the RHU staff are so busy with case-finding and treatment, and with whatever little health education their resources allow, that they do little epidemiologic analysis of the data collected at the municipal level. Some attempts at such analysis are sometimes made at the district meetings between the provincial health office and

RHU staff, but this discussion of what the figures and trends mean is often inadequate.

Eighth, there is need for improving the technical and social proficiency of RHU staff. More medical technologists and microscopists are required for the laboratory examination of stool specimens. Besides, for microscopists to be useful, the community must be willing to cooperate by submitting stool specimens, and where found positive, must come for treatment on a specified date. Realizing that they can only do so much, the RHU staff now justifiably want more health education materials or film shows on the disease.

Ninth, to ensure accuracy and consistency of program data and analysis at the field and central office levels, the basis for statistical computations must be clear and well understood. Areas where such inconsistencies routinely occur must be examined more closely at regular intervals.

Tenth, in an integrated public health system where the responsibility for delivery of public health programs lies with a front-line unit such as the RHU, these units must be the strongest link in the system. The strength or weakness of the RHU really determines the capacity of the public health system.

And finally, an area for further research is the disparity in program performance between locally funded and foreign-assisted projects. The significant drop in prevalence rate in projects assisted by the World Bank and the Asian Development Bank could be due to these projects' far greater resources. It could also be due to general improvements in the socioeconomic conditions in rural areas that benefit from the projects' rural development or irrigation and water supply interventions.

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Annex The Philippine public health system

The Philippine public health system is almost synonymous with the country's Department of Health (DOH), which is responsible for the formulation, planning, implementation, and coordination of policies and programs in health. Its primary function is to promote, protect, preserve, or restore the health of the people through the

provision and delivery of health services and through the regulation and encouragement of providers of health goods and services.

To carry out this mandate, the department operates through a network of public hospitals, medical centers, and health offices at the regional, provincial, city, district, municipal, and *barangay* or village levels. This system of public health facilities, located all over the country, comprises the health services infrastructure through which the three disease control programs (for schistosomiasis, malaria, and tuberculosis) are delivered to the affected population in endemic areas. These three programs are therefore inextricably bound with the DOH system.

The Department of Health in the 1950s

The foundation of the existing network of rural health units was laid in the early 1950s. The report of the United States' Bell Mission in 1950 stated that "unless the public health service is restored to a high degree of efficiency, the development of rural areas will be handicapped." In January 1951, the DOH proposed, under the US-assisted public health program, "small, well equipped units to render services in one entire municipality." The intention was to strengthen preventive and curative services in the *barrios* through a small team of health workers to be deployed in municipalities without health facilities.

An outcome of this proposal was the establishment of 81 demonstration rural health units (RHUs) in selected provinces in 1953. Each of these units was to deliver integrated health services, consisting of seven basic health services, i.e. maternal and child health, environmental health, communicable disease control, collection of health statistics, medical care, health education, and public health nursing. To carry out these tasks, each unit was staffed with a health team composed of a physician, nurse, midwife, and a sanitary health inspector with public health training. The Mutual Security Agency, the predecessor of USAID, provided each RHU with a jeep, refrigerator, sterilizer, microscope, and a year's supply of medicines.

The tremendously popular response to this initial effort led to the drafting and eventual approval of Republic Act no. 1082 in 1954. Two types of RHUs were proposed under this law. A Category I RHU was to have basically the same staffing as the demonstration RHUs. A Category II RHU, on the other hand, was to be headed by a physician or a public health nurse and have a midwife or a sanitary inspector. Municipalities with 5,000 or more residents were to be provided with a Category I health unit, while those with more than 35,000 inhabitants would have an additional Category II RHU.

The 1958 reorganization

The government-wide reorganization effort of 1958, under the newly elected President Magsaysay, was an attempt to reduce wastage, red tape, and inefficiency. The major reasons for the proposed decentralization and integration of health services were the following:

- Health services and activities had so expanded that a unified, centralized direction had become inexpedient and ineffective, necessitating a realignment and relocation of health functions for purposes of administrative direction, supervision, and control to ensure the fulfillment of a well-coordinated and well-rounded health program.
- Many entities in the DOH each had an administrative service staff, resulting in these entities being independent and compartmentalized, with the secretary losing part of his administrative control over them.
- The need for a well-directed and well-coordinated program of education and information designed to promote health and prevent diseases required the establishment of a central entity to provide consultation and advisory services from the national through the local level for related activities.
- The health activities of the government had for years been highly concentrated in Manila and were thus remote from the masses in rural areas. Decentralization of health services to a certain extent had therefore become desirable and imperative (Angeles 1971:30).

Although a number of organizational changes were introduced through this reorganization plan (implemented under Executive Order no. 288), the most striking feature was the decentralization of health services. Eight regional health offices, each headed by a regional director, were created. Each had an organizational structure parallel to that of the central office. The regional officers were given the task of administering, directing, coordinating, and supervising all preventive and curative health services and activities in the region not specifically reserved for line authority from headquarters, and of supervising through the provincial health offices the operation of hospitals in the region (Angeles 1971:37).

Besides the decentralization of health services to the regional, provincial, and municipal levels, this reorganization also converted central bureaus into staff units concerned with policy and procedure development. The bureaus ceased to exercise line functions, nor did they have any authority over field offices. The plan also provided for compulsory rotation of top administrative personnel between the regions and the department's central office every five years. [This was not complied with, however, until much later (Azurin 1988:16).]

In 1962, a WHO team reviewed the status of the national rural health program. The team conducted a comprehensive assessment of the program in various regions. Among other things, its report recommended that: (a) more attention be given to training RHU staff; (b) besides population, other relevant criteria be considered in determining the composition and staffing pattern of the RHUs; (c) the functions of RHU staff be redefined, to facilitate smooth integration of special health programs like malaria and tuberculosis; and (d) health staff assigned to remote rural areas be given suitable incentives (Tiglao and Cruz, 1975: 138).

Some incremental organizational changes occurred in the department between 1958 to 1972, including, as discussed in this case study, the creation of the National Schistosomiasis Control Commission in 1965. In the meanwhile, the decentralization envisioned under Executive Order no. 288 never materialized. That there was no real delegation of power to the regional offices during the 1960s and 1970s is established by the fact that most decisions still had to be made in Manila, including the approval of appointments, promotions, leaves of absence, and permission to teach (Azurin 1988:28).

The 1972 reorganization

After 1958, the next government-wide reorganization was undertaken in 1969, but was not implemented until September 1972, when martial law was declared. The DOH, like all other departments, became the subject of intensive studies carried out by the reorganization commission, which consisted of an all-Filipino staff.

Administrative decentralization was again the main theme of the 1972 reorganization plan. The country was divided into 11 (subsequently increased to 13) administrative regions with commonly accepted geographic boundaries and regional centers. Anticipating the natural reluctance of agency heads to delegate authority to field offices, the plan detailed the extent of authority to be delegated to the regional director. It also required that substantial authority be delegated by the agency head to the regional office within two years after the field offices were established (Presidential Commission on Reorganization 1984:11, 13).

The administrative power to be delegated to the regional directors included the authority to take final action on substantive and administrative functions, particularly: (a) the implementation of laws, policies, rules, and regulations which the agency was required to carry out; (b) implementation of agency programs in the field; (c) approval of appointments, promotions, transfers, and reinstatements of personnel, as well as investigation and decision on administrative complaints; (d) preparation and submission of budget proposals, authorization and disbursement of funds, and administration of the budget control machinery in the region; and (e) negotiation of contracts for services, supplies, materials, and equipment involving amounts not exceeding 50,000 (Azurin 1988:28-9).

The 1972 reorganization also provided for a common pattern of support services for all departments (for planning, administration services, and finance and management). Besides standardization of field and support offices, the new order placed hospitals, RHUs, and sanitaria under the administrative direction, supervision and control of the provincial health offices (Azurin 1988:27).

The 1974 and 1979 World Bank loans

In 1974, the Philippine Government signed an IBRD-GOP population project through which the DOH's institutional capabilities to serve rural areas were to be expanded. This project sought to construct, equip, and furnish additional health facilities and to implement a new system of health service delivery in rural areas (Azurin 1988:29).

The new system, implemented in 1976, was called the restructured health service delivery system. Its object was to make the midwives the first point of contact with the public. Subsequent referral was to be to the public health nurse and then to the doctor. A midwife was trained to treat simple ailments, to immunize, and to provide advice on environmental sanitation, family planning, and nutrition. She headed the *barangay* health station and was assisted by a *barangay* health worker, a volunteer.

To lay the groundwork for implementing the new service delivery mechanism, the IBRD-GOP project, as implemented by its autonomous project management staff, undertook a number of activities. It: (a) constructed and equipped 205 RHUs, 12 regional training centers, and 615 *barangay* health stations; (b) trained and employed about 5,000 midwives; and (c) trained field preceptors, such as RHU staff members and the regional training staff (Azurin 1988:30-1). With the construction of new physical facilities, and the training and deployment of midwives to the *barangay* health stations (which functioned as satellites of the RHUs), the project considerably expanded the health service infrastructure in rural areas.

The country's network of front-line services grew as the health service infrastructure expanded. This led to concern about support linkages between headquarters and field offices, and between central "staff offices" and the four vertical programs which were then run as self-contained programs within the DOH administrative system. (The four programs were the Malaria Eradication Service; the Family Planning Service; the Nutrition Service; and the Schistosomiasis Control and Research Service).

This concern was addressed through a research component of the IBRD-GOP project which sought to describe and analyze how support services (defined as those activities other than direct delivery of health services), were delivered to field and vertical programs within the DOH. It focused on four support services (planning, finance and management, administration, and health education and personnel training) and two vertical programs (family planning and nutrition).

The major findings of the functional analysis study, as the research was called, were grouped into two categories: (a) functional relationships between support units and the vertical programs; and (b) the flow of support services from the Central Office to field offices. The key findings of the study were that:

- Services extended by the support units to vertical programs tended to be too routinized and did not respond flexibly to specific program needs.
- There was little direct interaction between the vertical program offices and the support units. Probably partly because of this, there was no systematic evaluation of the performance of support units vis-a-vis program and field offices.
- Field offices were confronted with a common problem: the lack of resources — personnel, medical supplies, and equipment and drugs.
- Program targets set by the central office did not consider field conditions and the resources available.
- The provincial health office, which functioned as a relay point between the region and municipality, had very limited resources to supervise RHUs.
- RHUs, considering their limited personnel and resources, were overburdened by the existing reporting system (Carino, Alfiler and Albano 1982:ix-xiv).

After the termination of the first IBRD-GOP Population Loan in 1979, the World Bank granted the Philippines a second population loan for the period 1979 to 1984. Among other things, the health component of this loan was to be utilized to strengthen and expand the restructured health care delivery system, and to construct 75 health centers and 915 *barangay* health stations (Alfiler,1985:37-8).

In December 1978, a report assessing the changes introduced by the restructured health care delivery system made the following observations:

- The RHUs were now better organized and managed.
- The RHUs were goal-oriented, and each unit had targets and a schedule of activities.
- The changes introduced had generated a multiplier effect on those RHUs not fully receiving project support.

The report also noted some professional constraints at the municipal level with regard to disease control. It said: "the abbreviated content of the municipal health officer's epidemiological and sanitation training, however, sets limitations to his effectiveness in disease control and in environmental health improvement and these are in general left to the initiative and discretion of the sanitary inspector" (Angara 1978:11).

Also in 1979, an important development was the adoption of LOI 949. This policy directive mandated use of the primary health care approach for meeting the country's basic health needs.

The 1982 reorganization

Implementing and strengthening of restructured health care delivery system, the repeated push for administrative decentralization within the DOH, and the construction of additional rural health units and *barangay* health stations were all part of a sustained effort aimed at setting up an adequate health service infrastructure for the country's public health system.

This system was confronted not only with the dilemma of having to integrate vertical programs with general health services, but also with a "clear dichotomy between the so-called hospital men and the public health men" (Azurin 1988:42). Azurin summed up the adverse consequences of this on the bigger system, thus:

> The dichotomy between public health and the medical services had serious ramifications on the staff development, skill acquisition and coordination of efforts between the public health and the medical personnel of the Ministry. The public health team and the medical team had their separate enclaves and did not meet eye to eye in their respective effort towards health development.... Because of the rigid boundary between the public health and the hospital subsystems....the skills of municipal health officers as physicians tended to degenerate because of limited opportunities for continuing education and training in a hospital setting. Hospital chiefs and staff on the other hand, were so enmeshed in hospital routine that they did not appreciate public health principles and methods. The general result was a public health staff and medical staff unable to work together as a team to solve the health problems of their particular locality. (Azurin 1988:42-3)

The need to correct this situation prompted the issuance of Executive Order no. 851 in 1982 authorizing the integration of public health and medical subsystems into a unified health service delivery network. The functional integration of the two components of the public health system was achieved through areal integration, with the province serving as the point of unification. The areal and functional thrusts of this reorganization resulted in a combined integration-cum-decentralization type of reform.

The establishment of one unified line of command, to which the public health staff and the hospital subsystem were now linked, propelled the provincial health office to a position of greater prominence among the DOH's field offices. With the merger of the provincial health office and what previously was an almost autonomous provincial hospital, the new structure was renamed the integrated provincial health office. Under the supervision and control of the regional director, this office was held responsible for the "complete integration of the promotive, preventive, curative and rehabilitative components of the health care delivery system within the province." (Executive Order no. 851, section 14)

The provincial health officer exercised supervision and control over district hospitals and other DOH field units in the province. The district hospitals, for their part, served as the administrative arm — they exercised supervision and control over RHUs and specialized field health units which served as the out-patient section of the district hospital in their respective areas. *Barangay* health stations became extensions of RHUs. District hospital staff, as supervisors of RHUs, were expected to visit their satellite RHUs and extend necessary health services and to familiarize themselves with the implementation of public health programs.

The province, likewise, became the focal point for program administration and financial planning and management. Planning, earlier done by a vertical program, was now done on an areal basis. In financial management, the first change was the new system of direct budget release to the province and from there to the district. Under this new financial arrangement, there was greater flexibility in resource use within the province and the district so that municipal health offices could channel resources where they were most needed (Azurin 1988:44).

At the central office in Manila, a number of organizational changes supportive of integration and decentralization were also carried out. From the perspective of this case study, the most significant change was conversion of the four vertical programs from line to staff units. The implementation function of these offices was delegated to the regional health offices, with field operations to be gradually (within two years of approval of the reorganization) integrated with the provincial health offices (Azurin 1988:35). Full integration was expected to be completed by 1984.

The prospect of integration and decentralization was not warmly welcomed by many DOH personnel. As expected, resistance was caused by the fear of losing power and authority at the central and regional levels and by the prospect of being moved to another job assignment. There were also those who resisted the additional responsibility that came with integrating the public health and medical services (Azurin 1988:45).

The 1986 reorganization

With the change of government in February 1986, a new Freedom Constitution was adopted. This provisional constitution called for a government-wide reorganization to promote economy and efficiency and to eradicate graft and corruption. A new health secretary was appointed, and with the entry of a new management team, another era was

launched in the history of the DOH. Within the first 90 days of the new appointments, a thorough reorganization was set in motion.

This time, both the personnel and the existing organization came under close scrutiny, as all health officers were asked to tender their courtesy resignations. Reflecting its concern for field offices, the new leadership put premium on efficient, effective, and competent front-line services. Priority was given to the reorganization of field offices and to deploying to the field known achievers who could have been promoted to central office positions but preferred to take field assignments.

The current Department of Health structure

The department's central units were reorganized into three functional groups: (a) the Department Proper, a collective term for the offices and services based in the central office in Manila; (b) national health facilities; and (c) the department's field offices. The Department Proper is presently composed of the following (see Figure 5.2):

- Office of the Secretary.
- Office of the Chief of Staff.
- Office for Management Services.
- Office for Standards and Regulation.
- Office for Hospitals and Facilities Services.
- Office for Public Health Services.
- Executive Committee for National Field Operations.

National health facilities, as a collective term, refers to health institutions whose services and activities benefit the whole country's health care. These are either national medical centers or special research centers and hospitals. Located in the metro Manila area, these institutions are directly supervised by the Department Proper.

The "field offices" of the Department of Health include the following:

- Regional health offices.
- Integrated provincial health offices.
- City health offices.
- District health offices.
- Municipal health offices within the national capital region, and rural health units (RHUs) in the municipalities outside the national capitol region.
- *Barangay* health stations.

Figure 5.3 (on page 88) shows that the hierarchy of DOH's field offices — with the exception of the district health offices — is congruent with the administrative levels of the Philippine public administration system.

The Schistosomiasis Control and Research Service is one of 10 staff offices under the under secretary for public health services. The staff offices have common functions: (a) to formulate plans, policies, program, standards, and techniques for control of the disease; (b) to provide consultation, training and advisory services to implementing agencies; and (c) to conduct studies and research on the disease and its control.

The DOH's programs are implemented in the field by 12 regional health offices, 75 integrated provincial health offices, 58 city health offices, 393 district health offices, 2,072 health centers, and 9,402 *barangay* health stations and puericulture centers.

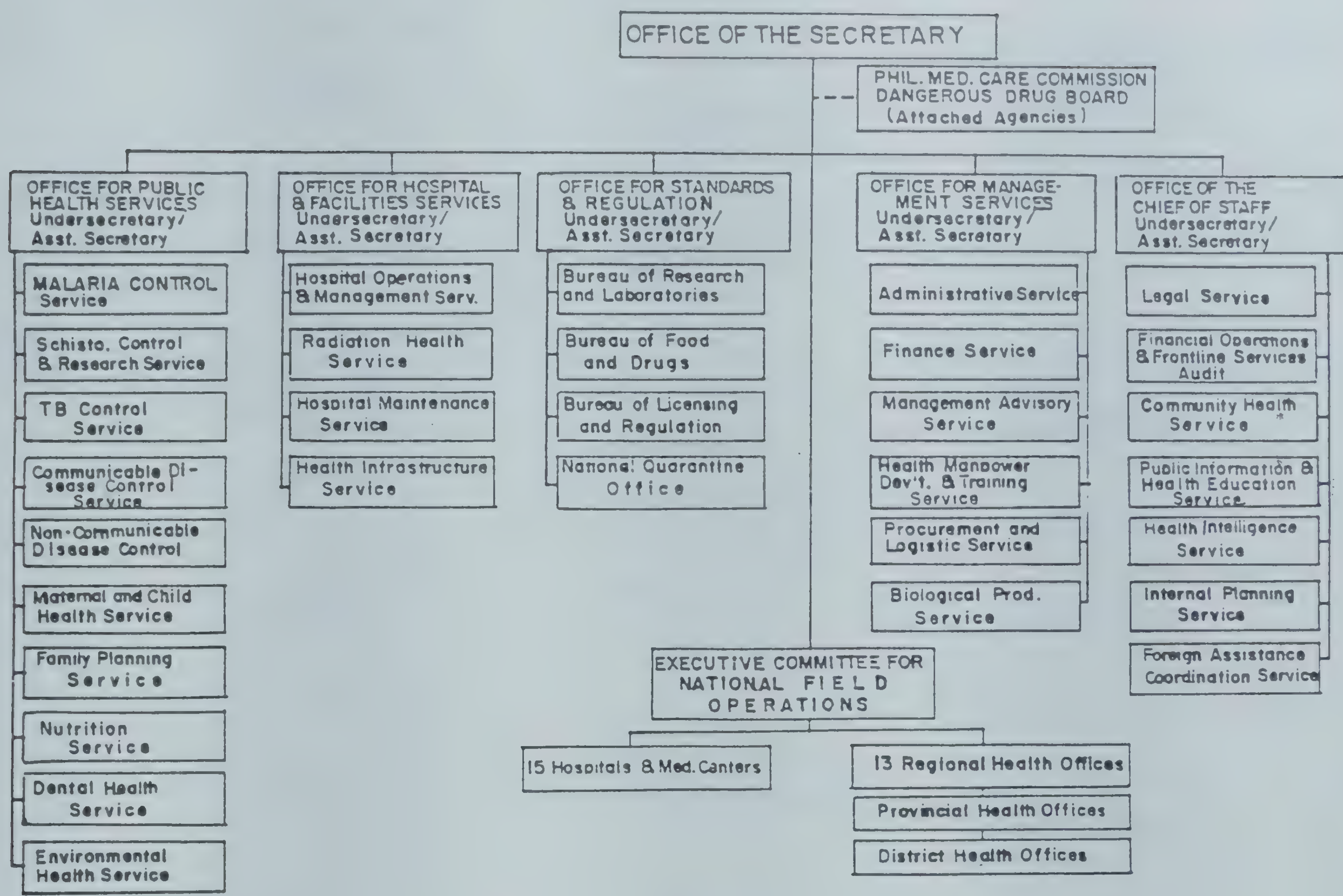
The functions of the various field offices have been clearly stated. The regional health office has responsibility for implementing laws, rules and regulations, policies, plans, programs, and projects of the department in the administrative region; and supervising all DOH agencies in the area including medical centers, regional hospitals, sanitaria, provincial health offices, and city health offices. A typical organization of a regional health office, showing how its functions are distributed among its units is presented in Figure 5.4 (on page 89).

The integrated provincial health office exercises supervision and control over district health offices and other field units of the department in the province except those that are directly supervised by the Department Proper or are under the regional health office. An example of an integrated provincial health office's organization is provided in Figure 5.5 (on page 90).

Each provincial office is headed by a provincial health officer who is assisted by one or two assistant provincial health officers depending on the province's size, population, health facilities, and budgetary provisions. In provinces where there are two provincial assistants, one assists the provincial health officer in supervising hospital operations while the other assists in supervising public health activities.

The district health office, which was created through Executive Order no. 119, has absorbed the earlier functions of the district hospital. The district office exercises supervision and control over district hospitals, municipal hospitals, RHUs, *barangay* health stations and all other DOH units, except those directly under the provincial health office, regional health office or the department proper. The health district, as a service catchment

Figure 5.2 Central organization of the Department of Health, 1987



area, is estimated to serve a population of about 75,000.

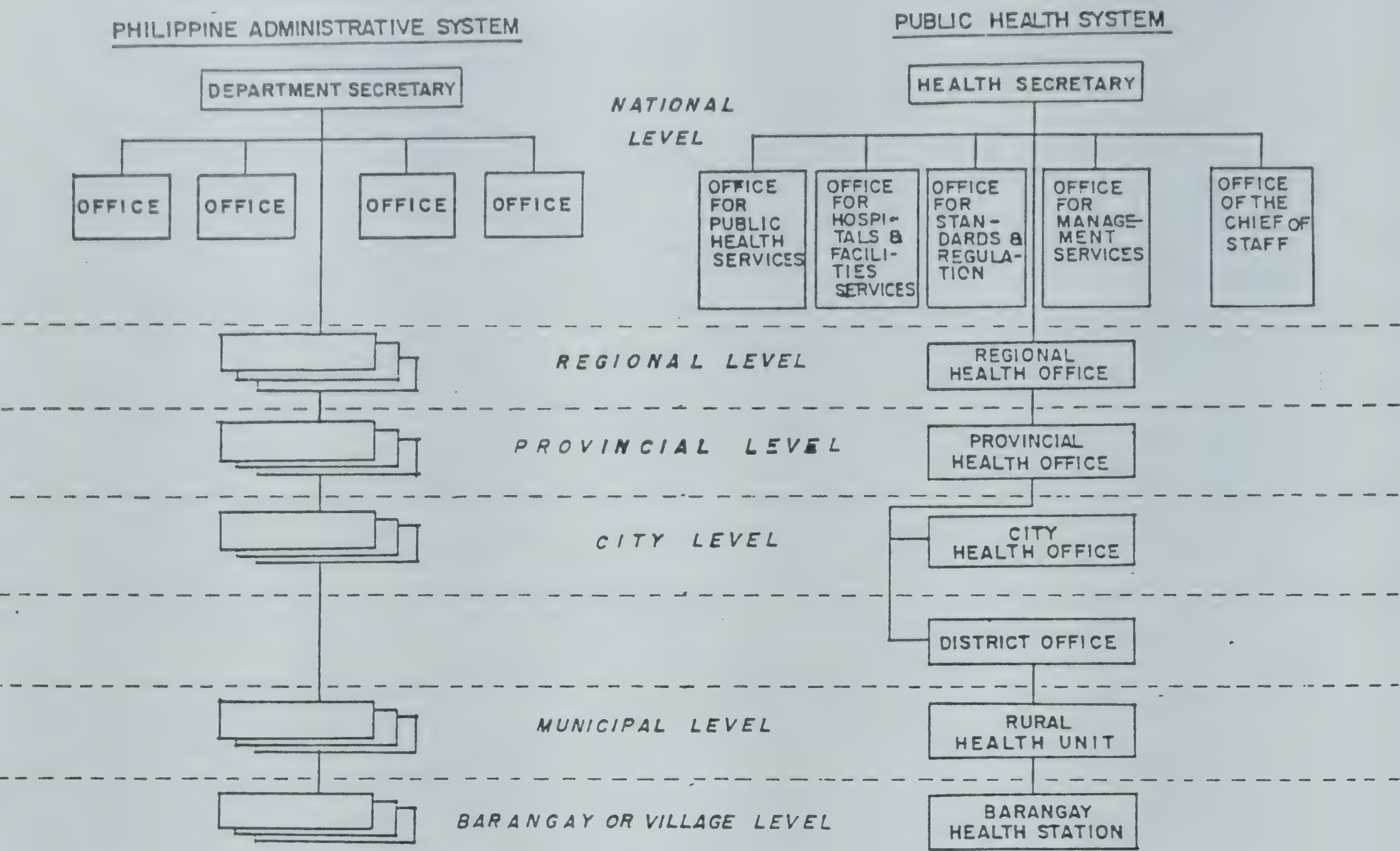
RHUs have responsibility for delivering basic health services which include maternal and child health, communicable disease control, collection of health statistics, environmental sanitation, health education, provision of nursing services, and simple and ambulatory medical care. An RHU serves a catchment area with about 20,000 population. Besides providing these services, the RHU functions as the outpatient unit of the district hospital.

Barangay health stations, as satellite units of the RHUs, are based in a strategic *barangay* and serve an average population of 5,000, usually in three or more *barangays*. Staffed by a rural health midwife, who is sometimes assisted by a volunteer village health worker, these stations provide services similar to those available at the RHU. Although the country has about 40,000 *barangays*, in 1988 the DOH had 9,402 *barangay* health stations and puericulture centers.

The RHUs and *barangay* stations together constitute the primary level of the Philippines' public health services infrastructure. It is through these health facilities that the system reaches out to the rural areas where the majority of the population resides. RHUs have increased by almost 49 percent between 1963 and 1988. Over a shorter period, 1980 to 1988, the number of *barangay* health stations has increased by about 28 percent. This growth of physical facilities has required a corresponding increase in health personnel and logistics.

The large size of the Philippine public health system is reflected in its staffing structure. As of 1988, the DOH's personnel included: 6,135 physicians, 9,112 nurses, 10,827 midwives, 2,355 rural sanitary inspectors, 1,234 dentists, 563 nutritionists/dieticians, 1,248 medical technologists, 535 pharmacists, 99 health educators, and 119 sanitary engineers (DOH, Annual Report, 1988). The increase in physical facilities, together with the corresponding growth in the number of personnel deployed in field units, certainly augurs well for the institutional capabilities of the public health system as well as for the low income rural residents that it can now reach.

Figure 5.3 Administrative levels of the public health system



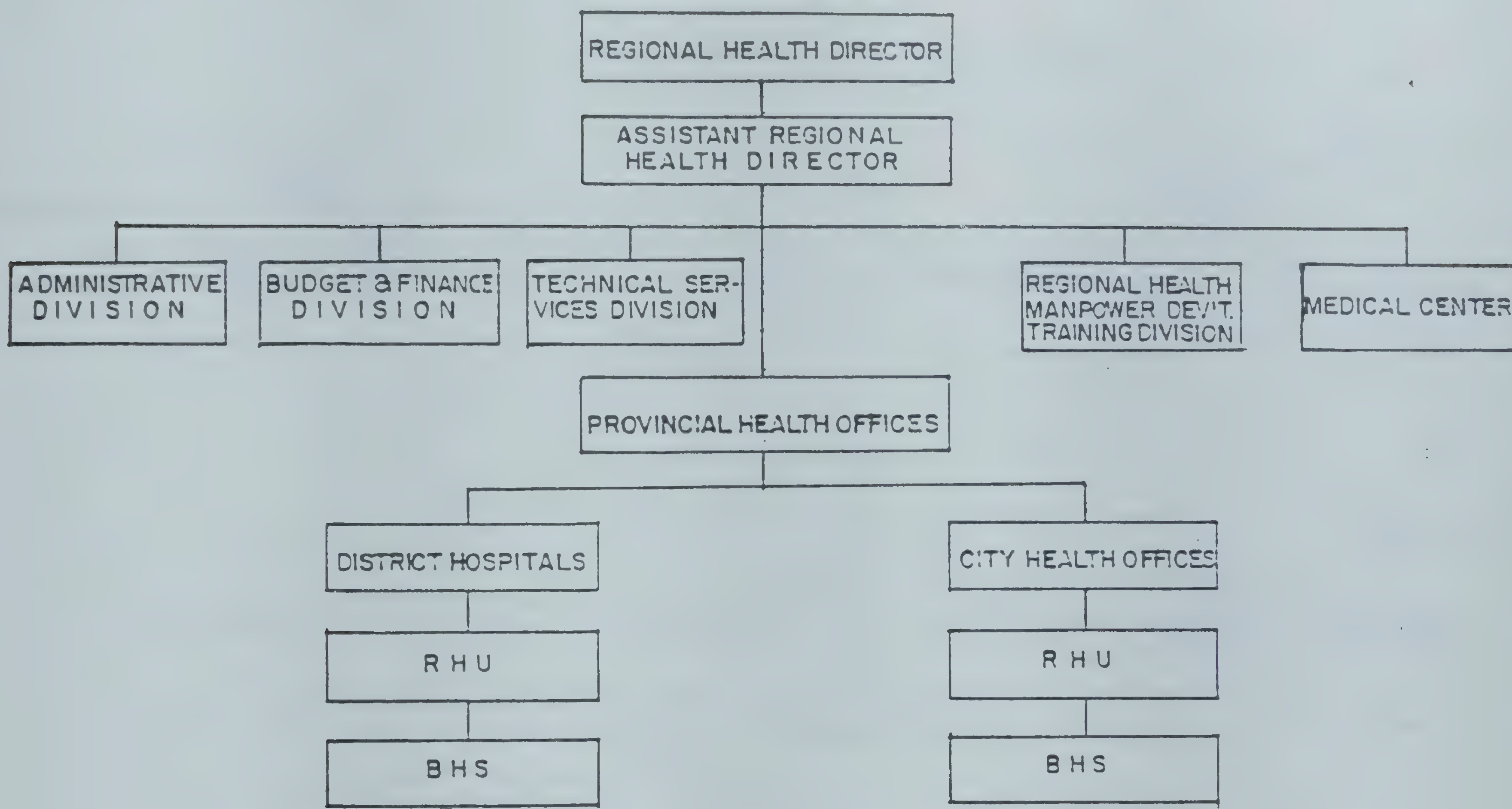
To sum up, the health services infrastructure of the Philippines has grown and developed along the international trends discerned by (Smith and Bryant 1988:911-12): over the last 30 years, it has had its era of medical services, followed by the era of vertical programs in the 1960s, and the shift to decentralized and integrated services by the 1980s.

However, the Philippine public health system started to decentralize much earlier than that of many other developing countries. By the mid-1950s, the DOH had recognized the need for administrative decentralization, and created regional offices in various parts of the country. Unfortunately, this policy directive, although formally authorized, did not bring about the intended decentralization. The structures were set up, but delegation of power to field units did not occur. A more successful push for decentralization came during the early 1970s when, under martial law, 12 administrative regions were created for all departments, and explicit guidelines were issued detailing the specific authority to be delegated to regional directors.

The evolution of the Philippines' public health services infrastructure shows that:

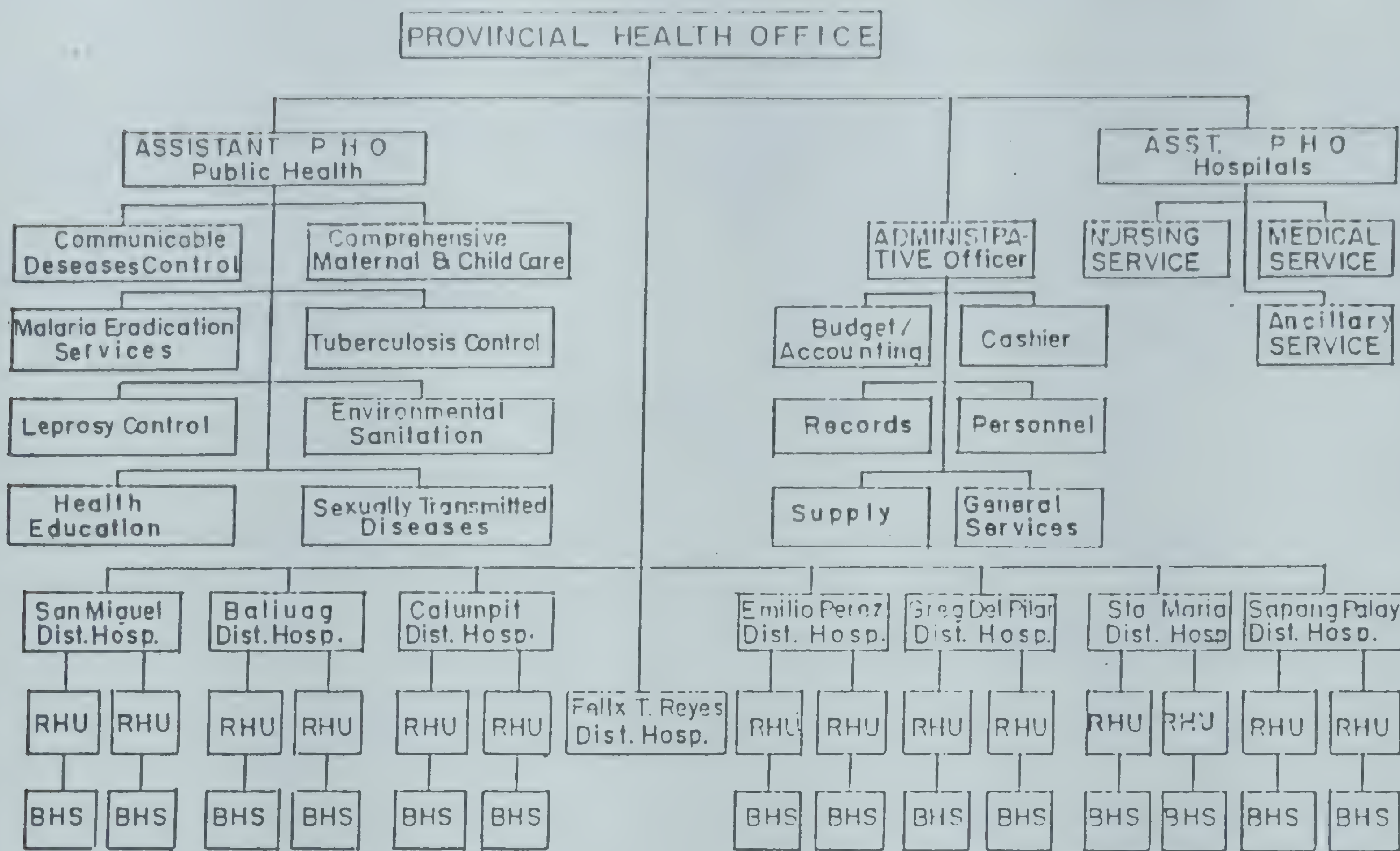
- The Philippine Government's attempts to expand rural health units in the mid-1950s were not realized due to the limited resources allotted for health. Physical facilities were constructed in the field after external financing was obtained in 1974.
- Decentralization of health services to field units requires that the central office be willing to delegate more authority to field units. Field units, on the other hand, must prove that they have the institutional capacity to carry out additional tasks and functions.
- If the institutional capabilities of field units are strengthened through decentralization, and if the necessary manpower and logistical support are available, integration of programs can proceed at a much faster rate at the RHU and *barangay*-station levels.

Figure 5.4 Organizational chart of the regional health office



- Without the required health services infrastructure network, administrative decentralization of health services can not occur; and without some degree of decentralization, health programs cannot be integrated, either.
- In the Philippines, attempts to transfer responsibility for disease control programs from vertical to integrated operations have been hampered by efforts to decentralize and integrate these functions at a time when the system was unprepared to assume greater administrative and technical responsibilities.

Figure 5.5 Organizational chart of the provincial health office



6

The Philippines: Tuberculosis control

Introduction

Disease incidence

Despite medical advances in the treatment of tuberculosis (TB), the disease is a major public health problem in the Philippines. From 1980 to 1985, TB was the third leading cause of death and the fifth leading cause of illness in the country (Philippines health statistics). Although the annual TB mortality rate has been going down, there has been no significant decrease in the absolute number of deaths from the disease. During the period 1965-85, on average, more than 26,000 Filipinos died of tuberculosis annually. The highest number of deaths was 31,805 in 1977; the second highest was 31,650 in 1985.

Based on the National TB Prevalence Survey conducted in 1981-83, it was estimated that in 1988 more than 387,560 Filipinos had infectious tuberculosis and each of these, in turn, transmitted TB infection to an average of 10 persons per year. About 10 percent of the latter would eventually become tuberculous several years after primary infection; and about 50 percent of these would subsequently become infectious (Valezaand others 1988:1).

Tuberculosis control

Tuberculosis is caused by two types of bacteria: (a) the *mycobacterium bovis* which is transmitted to man when he drinks infected cow's milk; and (b) the *mycobacterium tuberculosis* or the acid fast bacillus which has no other host than man and is transmitted only by persons suffering from severe or active pulmonary tuberculosis (PTB) when they cough, sneeze, or spit out sputum laden with the bacillus (Oxfam Health Unit 1980:7). In the Philippines, the latter form of TB is the most common.

The basic tools for controlling TB in both developed and developing countries are BCG vaccination, case-finding, and chemotherapy. WHO and UNICEF urge developing countries to give greater emphasis to mass BCG vaccination than to case-finding and chemotherapy, because of the vaccination's much lower cost and ease of application and because it directly improves the health of children. Vaccination, however, remains a controversial preventative measure despite 50 years of use, because its protective efficacy ranges from 0 to 80 percent (PCHRD 1988:7). Besides, it does not break the chain of logarithmic transmission of the disease among adults. Nonetheless, this approach prevents serious forms of TB among

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Note: This case study was prepared by Ma. Concepcion P. Alfiler, assisted by Rosa R. Cordero and Ms. Teresa T. Parroco, University of the Philippines; based on field work in 1989. Revised by Paramjit S. Sachdeva, the World Bank. Cooperation of staff of the Department of Health, the Philippines; secretarial assistance provided by Carol Knorr and Jeffry Pickett, the World Bank; and funding by the Edna McConnell Clark Foundation (grant number 04687) and the World Bank are gratefully acknowledged. The views expressed herein do not necessarily represent the official position of the World Bank, Clark Foundation, or the Philippines Government.

children, if given before the child is exposed to sources of infection (Tan and Mantala 1987:7-8).

There are three methods of identifying TB cases: (a) sputum microscopy; (b) sputum smear culture; and (c) chest X-ray. Sputum microscopy is the cheapest and most appropriate case-finding method in rural areas as it can be performed even without electricity. However, it only identifies TB patients whose sputum is already heavily laden with AFB and not those who are suffering from either less severe or early stages of PTB. Sputum smear culture can detect the less severe type of PTB or the presence of very few bacteria in the sputum, but is seldom used in developing countries because of its high cost and the expertise required. Chest X-ray can detect most stages of PTB cases; but it cannot be performed in areas without electricity, is more expensive than sputum microscopy (but cheaper than sputum smear culture), and does not allow distinction between the sputum-positive and the two other stages of TB.

One of the major developments in the non-pharmacologic treatment and care of TB patients is the shift from the institutional approach (confinement in hospital) to the domiciliary/ambulatory approach (out-patient TB service and self administration of drugs). Hospitalization is now limited to serious or complicated TB cases (PCHRD 1988:4). The even more recent trend, however, is toward community-based approaches wherein community health workers assume a significant role in case-finding, in ensuring that patients are religiously taking their drugs, and in educating families on what the disease is and how the community can help in controlling it (Tan and Mantala 1987:9).

Effective treatment of TB involves a combination of two or more drugs. In the Philippines, the standard regimen is composed of isoniazid and either streptomycin, ethambutol, or PAS, while the short-course chemotherapy is composed of isoniazid, pyrazinamide, and rifampicin. The standard regimen is cheaper than the short course, but its treatment period is twice as long. This factor adversely impacts the effectiveness of treatment programs in developing countries where SR is the main regimen used due to its lower cost.

Isoniazid can protect household contacts of TB cases from developing the disease, but a country with very limited resources has to think twice before using this drug for chemoprophylaxis (PCHRD 1988:8). The more appropriate preventive measures — apart from mass BCG vaccination in developing countries — are proper nutrition, hygiene, and ventilation which can be effected through intensified information campaigns and, more importantly, through improvement of the socioeconomic conditions of families below the poverty line.

Program strategy and organization

Historical evolution

In response to a worsening TB problem, the Philippine Tuberculosis Commission, the first public agency for TB control, was established in 1930. Two years later, the commission was replaced by the Tuberculosis Section created under the Bureau of Health (now called Department of Health). The Commission and the Tuberculosis Section adopted a "vertical" organizational approach to TB control. This arrangement continued, with minor modifications, into the 1950s.

In 1954, Republic Act 1136, otherwise known as the Tuberculosis Law, was passed to assure funds, albeit inadequate, for the control of the disease (Valeza and others 1988:1); and to further centralize the TB control structure through nationalization of all TB dispensaries (including the foreign-assisted and WHO/UNICEF-assisted TB and BCG units), all TB clinics supported by local governments and private TB "pavilions" that were to be voluntarily turned over to the government. (Angara 1955 in Tiglao and Cruz 1975:166). In the same year, however, Republic Act 997 was enacted, subordinating the centralized structure provided for by Republic Act 1136 to a decentralized and integrated TB control structure in which the Tuberculosis Division could perform only staff functions, as the regional health offices would henceforth administer and supervise program implementation (Tiglao and Cruz 1975:167).

But it was only in 1968, after a series of pilot-tests in four provinces, that Republic Act 997, as amended by Republic Act 1241, was fully implemented — partly because "it took time for the regions to be organized and manned and to absorb the idea of integration of services" (Tiglao and Cruz,1975:167-70).

Hence, from 1930 to 1967, the government's TB control program had a vertical structure in which field activities were carried out primarily by public TB dispensaries and chest clinics under the direct supervision and control of central authorities. However, the number of TB personnel and facilities was insufficient to cover the more than 1,500

municipalities, so the program did not achieve nationwide coverage.

In 1968, in accordance with Republic Act 997, as amended, the Tuberculosis Division was transferred to the Bureau of Disease Control and was assigned only staff functions. Simultaneously, the TB control program was integrated into the general health service structure by making TB control part of the routine activities of the rural health unit (RHU) (Valeza and others 1988:2). As there were enough RHUs to serve all municipalities, the integration of the program paved the way for the nationwide implementation of the National Tuberculosis Control Program (NTP).

In the same year, the program shifted its main case-finding method from X-ray to sputum microscopy and adopted the domiciliary approach to patient care along with use of the standard regimen (Valeza and others 1988:2).

The integrated structure for the NTP was further strengthened at the lower levels in 1984 when, through Executive Order no. 851, the Department of Health (DOH) — then called the Ministry of Health) was reorganized, with the objective of integrating hospital and public health services in accordance with the concept of primary health care.[1] The district hospital and the RHU were both placed under the direct supervision and control of the district health office, thereby making it easier for the RHU staff to refer TB cases that they could not handle to the district hospital.

At the same time, Executive Order no. 851 significantly weakened the NTP structure at the central level by reducing the Tuberculosis Division into a mere "section," with only four medical staff and a clerk to perform the staff functions, despite the fact that TB was still a major public health problem (it was the third leading killer and fifth leading cause of illness among Filipinos). Funds for TB control also remained inadequate.

The latest structural change in the NTP occurred in 1986, when the DOH was again reorganized by Executive Order no. 119. This time the NTP structure at the central level was significantly strengthened by elevating the status of the Tuberculosis Section into a TB Control Service under the Office for Public Health Services with a personnel complement of 38, while the former structural arrangements at the lower levels were maintained. And, for the first time in the history of TB control in the Philippines, since 1987 the program has been given additional funds for drugs and laboratory supplies.

Control strategy and approach

From 1980 to 1986, the main control strategy has been preventive in nature, emphasizing the protection of healthy individuals through mass BCG vaccination. Case-finding and treatment of TB cases were also undertaken, but only on a limited scale because of inadequate resources. From 1987 to date, however, the program has given equal emphasis to preventive and curative aspects — the government has allotted adequate funds for drugs and laboratory supplies, while UNICEF has continued its ample assistance for mass BCG vaccination.

Since 1968, there has been no change in the case-finding methods used. Sputum microscopy is the primary method of identifying infectious TB cases, while X-rays are used for TB symptomatics whose sputum examination is negative in two consecutive examinations.

The program, however, has changed its case-finding approach from "passive" to "active," in line with the primary health care (PHC) approach to TB control (adopted in 1986). Under the "passive" approach, RHU and *barangay* health station staff waited for TB symptomatics to come to the health center. The "active" case-finding approach involves a house-to-house identification of TB symptomatics and collection of sputum by health workers with the assistance of trained *barangay* health workers. Occasionally, this is done with the help of untrained members of civic organizations sponsoring *barangay* outreach programs. This significantly increases the number of sputum samples examined, but drastically affects the positivity rate because untrained volunteers are not capable of identifying the real symptomatics.

The program's policy is to give priority to positive cases because they transmit the disease to healthy individuals. To encourage health workers to regularly undertake and intensify their active case-finding activities, each RHU and *barangay* health station is required to meet a quota of at least one positive sputum per month. There are fears, however, that the imposition of a quota might lead to splitting of one positive sputum into several slides in order to meet the quota, and this could spuriously increase the reported prevalence rate.

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1. For details of the evolution and present structure of the Department of Health, see the Annex of "The Philippines: Schistosomiasis Control."

Home visits by health personnel and *barangay* health workers seek to ensure that the patient is regularly taking his medicines, and remind him to come to the health center for regular treatment and check-up. Hospitalization is done only for complicated TB cases and those with adverse reactions to drugs that cannot be handled by RHU staff.

From 1980 to July of 1986, both infectious and noninfectious TB patients have been treated through the standard regimen which entails a treatment period of 12 months, and is composed of Isoniazid tablets and streptomycin intramuscular injections.

Patients who can not come to the health center for SM injections or have adverse reactions could be given other drugs, such as PAS or Ethambutol, in addition to isoniazid. Unfortunately, however, these drugs are not available in most RHUs, especially in remote areas where many TB patients can not come regularly to the health center due to travel difficulties and/or lack of money for the fare. This, plus the muscular pains resulting from streptomycin injections and the long period of treatment, has contributed greatly to the low treatment completion rate during the period 1980-86. The rate was only 41.29 percent in 1985 (1988-92 Directional Plan for the National Tuberculosis Control Program, n.d.:1), and only 38 percent in previous years (Annual Report 1986, c. January 1987:12).

In response to these problems, the program started using short course chemotherapy in August 1986, simultaneously with the launching of the "Strengthened National Tuberculosis Control Program." The advantage of the short-course chemotherapy over the standard regimen is that the treatment period is halved to only six months and the drugs are taken orally, and hence can be self-administered at home.

To facilitate the administration of short-course drugs, these are supplied to the patients in blister packs containing the weekly dose. Blister packing is done at the central level to obtain economies of scale. The only disadvantage of the short-course therapy is its cost. As of November 1988, it cost Pesos (P) 821.84 per patient compared with P629.75 for the standard regimen. Hence, field personnel have been instructed to use short-course drugs only for newly discovered sputum positive cases, lung cavitary cases, and treatment failures of the standard regimen. Also excluded are those likely to have adverse reactions to short-course drugs, such as patients with a history of liver disease and/or chronic and acute renal disease, patients with gout or predisposition to gout, and patients using steroids for more than six months (Manual of the NTP, 1988: 32).

For those who do not qualify for the short-course chemotherapy, the TB Control Service is currently undertaking a feasibility study of the intermittent short-course regimen to replace the standard regimen. The intermittent short-course regimen has the same treatment period (six months) and combination of drugs (isoniazid, pyrazinamide, and rifampicin) as the short-course therapy, but its rifampicin component is administered less frequently (twice a week) than in the short-course (daily). The cost of the intermittent short-course regimen, estimated at P292 per patient in 1988, is much lower than that of the standard regimen. Should the study show favorable results, the standard regimen will be phased out eventually, the treatment period will be reduced from 12 to six months, and this will probably increase the treatment completion rate while enabling the program to generate savings from its budget for drugs.

Program objectives and targets

The overall program objective is to effectively control TB so that it will no longer be a major public health problem by the year 2000. In accordance with recommendations of WHO (Western Pacific Region), the program has set its medium term objectives for the period 1988-92 as follows:

- Reduction of TB mortality rate from 48.3 to less than 10 per 100,000 population so that the disease will no longer be among the 10 leading causes of death.
- Reduction of the prevalence of infectious pulmonary TB based on microscopic examination of sputum from 6.6 to less than one per 1,000 population.
- Reduction of the percentage of tuberculin reactors among the unvaccinated children at the time of school entrance from 15 percent to less than 5 percent (TB Control Service Directional Plan 1988-92, c. January 1988:3-4).
- At the same time, however, the TB Control Service has set its annual target for case-finding and treatment during the same five-year period at only 40 percent of the eligible population. This, according to WHO regional officials, will not enable the DOH to eradicate TB by the year 2000 and

will only result in waste of time and resources because the rate of transmission, which is 10 persons per infectious TB case, is faster than the rate at which DOH will control the disease (Daily Globe, March 21, 1989: 6; Manila Bulletin, March 27, 1989: 5). But DOH officials contend that although they have adopted the objectives recommended by WHO, the program cannot set higher targets, given the available resources. Nonetheless, they intend increasing the program's target if the present negotiations for foreign assistance are successful.

The national objectives and targets are disseminated by the TB Control Service to the lower levels of the DOH before the start of their planning period, and serve as the "planning norm." The formula used for setting annual targets and data requirements (except population figures) is the same at all levels in all regions. In short, the program adopts a top-down standardized approach to planning.

While this approach simplifies the planning process at lower levels, it does not result in realistic targeting. In 1989, for instance, all DOH field offices were required to use the following formula: number of sputum-positive cases to be identified = population x 0.66 percent x 40 percent, where 0.66 percent was the national prevalence rate of sputum positive cases while 40 percent was the proportion of cases that the program expected to cover based on available resources.

Thus, it was assumed that all regions, provinces, districts, and municipalities had the same prevalence of sputum-positive cases and that DOH field units did not differ in terms of resources. This obviously results in over-targeting in areas or units that have relatively less manpower and facilities, and under-targeting in the case of those that have relatively more resources.

Organizational structure and functions

The organizational structure of the program, from the central to field offices of the DOH, is shown in Figure 6.1 (overleaf). The detailed structure and functions of the NTP at each hierarchical level are discussed in Annex 1.

At the central level is the TB Control Service, under the direct supervision and control of the Office for Public Health Services. It has 38 staff, headed by the chief of service who is assisted by a medical specialist III. There are three divisions: (a) administrative service; (b) plans and programs division; and (c) monitoring and evaluation.

The regional health office, under its director, is responsible for the implementation, supervision, coordination and logistics of the NTP in its region. It delegates most of these functions to the regional TB coordinator, who reports to the RHO's chief of technical services, but is under the technical supervision of the TB control service's medical staff.

The integrated provincial health office and the city health office are responsible for the implementation, coordination and supervision of the NTP in the province and city, respectively. However, the provincial and city health officers delegate most of their NTP functions to the designated TB coordinators in their respective offices' technical sections. These coordinators are under the technical supervision of the regional TB coordinator but are under the administrative supervision and control of the provincial or city health officer respectively.

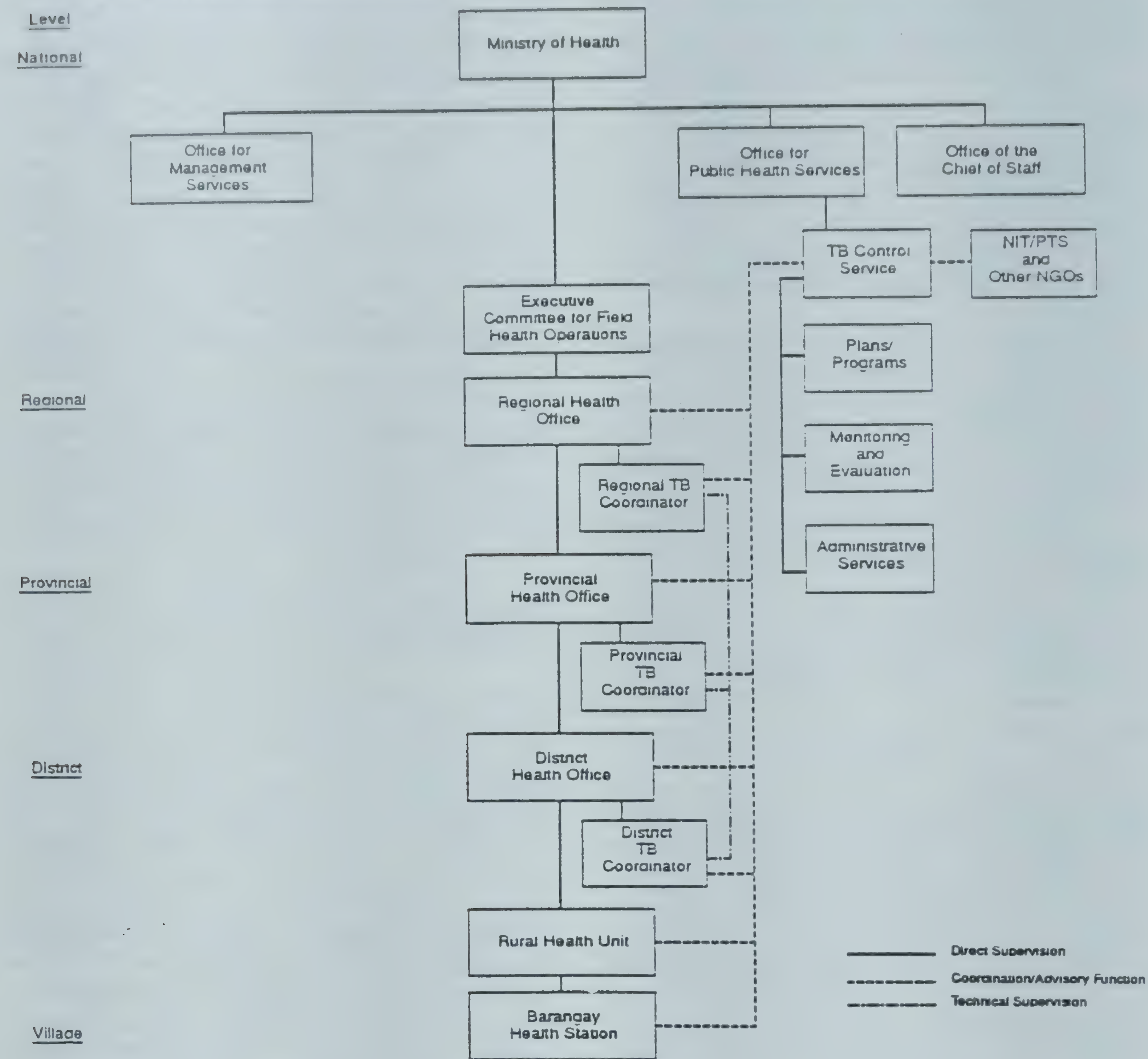
Tuberculosis control in Bulacan and North Leyte

Organization and staffing

The two regions covered by the present case study differ in terms of the number, type, and workload of health personnel designated as regional TB coordinators. Region III has only one regional TB coordinator, a female doctor (medical specialist III) who concurrently serves as the regional coordinator for malaria. In addition, she is expected to monitor and technically supervise the implementation of all other public health programs in the province of Bulacan. Region VIII, on the other hand, has two regional TB coordinators — a male doctor (medical specialist I) and a female nurse (regional nurse supervisor) — who devote all their time to the NTP except when they are requested to assist in other programs. At present, however, the medical TB coordinator for Region VIII is on study leave for a master's degree in public health.

Differences were also observed in the number, type and workload of health personnel designated as TB coordinators in the two sample provinces (Bulacan in Region III and North Leyte in Region VIII).[2] Bulacan has two provincial TB coordinators — a male doctor and a female nurse — both of whom were former staff members of the now abolished provincial chest center. They supervise and monitor the implementation of NTP

Figure 6.1 Organizational structure of the National Tuberculosis Control Program



in all eight health districts of the province, and report to the assistant provincial health officer.

The province of North Leyte, on the other hand, has a medical TB coordinator (a male doctor) who concurrently serves as the chief of the integrated provincial health office's technical section, three nurse TB coordinators (all of whom are female public health nurses), and a female provincial umpire-technician. Each nurse TB coordinator supervises and monitors three adjoining health districts (there are nine health districts in the province). The provincial umpire-technician is responsible for validating the results of sputum examinations, reconciling discrepancies between the findings of the medical technologist/microscopist and the rural health midwife who is trained in sputum microscopy, and providing repair and maintenance of microscopes in the province.

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2. The province of Bulacan is in Region III. It has a land area of over 2,627 square kilometers and an estimated population of about 1.4 million (or 23 percent of the population of Region III). It has 24 municipalities, and is divided into eight health districts. The province of Leyte is in Region VIII. It has a land area of over 5,146 square kilometers and is the biggest of the six provinces of the region. It has a population of over 1.13 million (or 35 percent of the population of Region VIII). It has 41 municipalities and two cities. The Department of Health maintains 45 health centers, 189 *barangay* health stations, and five puericulture centers in North Leyte.

The district health officer, who concurrently serves as chief of the district hospital, is primarily responsible for the implementation, supervision, coordination, and logistics of the NTP at the district level. As per the NTP manual (1988), each health district is supposed to have a district TB coordinator-designate who assists the district health officer and chief of district hospital in the performance of the above mentioned functions. The two health districts (San Miguel district in Bulacan, Region III and Abuyog district in North Leyte, Region VIII) visited for the case study, however, have no district TB coordinator. Instead, they have district coordinators who assist the district health officer in the supervision of all public health activities of all RHUs in the health district. San Miguel district has two district coordinators — a male doctor and a female nurse. Both of them, however, are not really district-level health personnel as far as their official designation and primary functions are concerned.

The doctor primarily serves as the municipal health officer of San Miguel RHU III, while the nurse is a public health nurse paid for and seconded by the provincial government to San Miguel RHU II. They have simply been assigned, by the district health officer, the additional functions of district coordinator. The municipal health officer of RHU III has been assigned to assist the district health officer in the supervision and coordination of all municipal health offices; while the public health nurse of RHU II has been assigned to gather and review the periodic reports of all municipal health offices and to consolidate these into monthly, quarterly and annual district reports for transmittal to the integrated provincial health office. Given their workload as RHU staff and concurrently as district coordinators for all public health programs, they cannot be expected to devote adequate time and effort to supervising and coordinating all NTP activities of all RHUs in the district.

On the other hand, Abuyog district has only one district coordinator — a female public health nurse who devotes all her time to this job. As the lone district coordinator for all public health programs, however, she also encounters difficulty in coping with the demands of the NTP in the district. Also, since a nurse is supposedly junior in status to doctors in the medical profession, she is sometimes hesitant to supervise the municipal health officers in the district (who are all doctors).

The RHU is responsible for implementing the NTP in the municipality. Hence, the municipal health officer is primarily responsible for the NTP at the municipal level, with the assistance of all other health personnel of the RHU. The *barangay* health station is a satellite health center of the RHU, and is manned by a rural health midwife, assisted by the volunteer *barangay* health worker(s). The detailed duties of the rural health midwife are given in Annex 1.

At the central level, the TB Control Service appears to be well staffed. However, additional staff are urgently needed at lower levels. Based on the experience of Region III, the program obviously suffers when there is only one TB coordinator for the region and when he/she concurrently serves as a regional coordinator for other programs. Ideally, each region should at least have a medical TB coordinator and a nurse TB coordinator who work full-time for the NTP.

The existing arrangement in the province of North Leyte — where there is a medical TB coordinator (who concurrently serves as the chief of medical section), three nurse TB coordinators (who are assigned to supervise three health districts each), and a provincial umpire-technician — is much better than in Bulacan province where both the medical and the nurse TB coordinator cover all health districts. Even North Leyte can further improve its set-up by designating a full-time medical TB coordinator.

In general, the following personnel-related problems are being encountered during program implementation:

- Absence of full-time district TB coordinators.
- Lack of medical technologists to staff the microscopy centers (as of 1988, about 57.7 percent of the microscopists were not trained medical technologists but were either nurses or midwives. One of the main reasons for the low positivity rate could be that the latter are not as skilled in microcopy as medical technologists).
- Insufficient RHU and *barangay* health station personnel.
- Negative attitude of some nurses and midwives toward sputum collection and sputum smear preparation, due largely to the fear of acquiring the disease in the process.
- Lack of training of field staff in techniques of collecting and preparing good sputum specimens.

In view of the shortage of rural health midwives and nurses in many areas — and because these personnel usually consider sputum collection and sputum smear preparation risky — the "active" case-finding approach will obviously become more effective if full-time TB canvassers are hired.

Financial and physical resources

DRUGS AND LABORATORY SUPPLIES. Prior to adoption of the short-course chemotherapy in 1986, all government allocations for the procurement of anti-TB drugs and laboratory supplies were part of the integrated provincial health offices' annual budget. Since 1986, such allocations have been part of the annual budget of the TB Control Service, but funds for standard regimen drugs and for emergency purchases of laboratory supplies have remained part of the provincial offices' annual budgets.

Consolidated data on the integrated provincial health offices' budget for the TB program for the period under study are not available. Hence, the total amounts allocated for drugs and laboratory supplies before and after adoption of the short-course therapy cannot be compared. Nonetheless, DOH annual reports and occasional papers about the NTP acknowledge that inadequacy of funds was a perennial problem until 1986.

From 1987 onwards, the TB Control Service has been given an annual budget of P150 million for SCC drugs and laboratory supplies. However in 1987, field units still had problems because no short-course drugs were available for six months of the year (Annual Report 1987, c. March 1988:6). This was primarily due to the pharmaceutical company's failure to meet its contractual obligations and the laxity of the central procurement and logistics service in ensuring strict compliance with delivery dates. Consequently, the delayed delivery of short-course drugs for 1987 resulted in overstocking of drugs up to the first quarter of 1989. In some areas, the problem of overstocked and expiring drugs was compounded by the failure of higher-level field offices to promptly distribute the drugs to lower levels due to lack of transport facilities and TB coordinators (Annual Report 1987, c. March 1988:7).

There is also an urgent need to provide RHUs and *barangay* health stations with sufficient slide boxes. In the absence of these, slides containing sputum smears are being wrapped in coupon bonds or other kinds of paper to which the sputum is likely to stick, thereby adversely affecting the quality of the specimen.

EQUIPMENT. Shortage of microscopes has also been a continuing problem; and this is one reason why X-ray and fluoroscopy have remained popular among TB symptomatics, even though the program adopted sputum microscopy as its main case-finding method more than 20 years ago. In 1988, the DOH had 1,663 microscopes, but only 1,331 (about 80 percent) were functional (NTP Annual Report 1988, n.d.:24). Besides, many of the functional microscopes are of monocular type which is much more difficult to use than the binocular type.

In 1988, the ratio of functional microscopes to the population was about one to 44,118. According to the TB Control Service, the ideal ratio for an integrated microscopy program is one to 20,000 (NTP Annual Report 1988, n.d.:24). Based on field interviews and observations, however, the ideal situation would be to provide every RHU with at least one binocular microscope for TB case-finding, and one each for malaria and schistosomiasis microscopy work in areas where these diseases are endemic. Other public health programs should have access to these microscopes only when they are not being used for the programs to which they are primarily allocated. Hence, the NTP should have at least 1,991 functional binocular microscopes for the RHUs alone (based on the number of RHUs in 1985), plus one for each health district for sputum smear checking and several reserves at the integrated provincial health office to be lent to district hospitals and RHUs whenever their microscopes need repairs.

The absence of two-way communication equipment is also a pressing problem in the health districts of North Leyte. There is no other way for the district and provincial health offices to speedily communicate with each other between supervisory visits by provincial health personnel.

VEHICLES. The lack or absence of utility vehicles is another major problem. The TB Control Service has only one vehicle which cannot be used for supervisory visits to rugged areas, and cannot accommodate the bulk of medicines distributed to the regions. In the field, there are no vehicles for the exclusive use of the NTP. Although the RHOs and integrated provincial health offices have some vehicles for the use of all DOH programs, sometimes these are not available when the TB coordinators need to conduct supervisory visits. In such cases, the coordinators use public transport, if it is available. There is a scarcity of public transportation in Region VIII.

IEC MATERIALS. The sample RHUs and *barangay* health stations had not received any printed IEC materials for anti-TB campaigns since 1985-86. Many field staff, however, seemed unconcerned

about the absence of such materials because, according to them, leaflets and other such materials are not the most effective means for disseminating information on TB control, especially in rural areas — where leaflets are mostly used as wrapping paper by recipients who are illiterate or too lazy to read.

NTP staff are more concerned about the absence of regular television and radio messages on TB control, as well as with the scarcity or absence of facilities and equipment for film showing. The radio is the most effective means of disseminating information in even the most remote rural areas, followed by films that can easily attract and amuse residents who have no access to cinema theaters.

Service delivery

Community participation

All program services, including BCG vaccination, sputum microscopy, X-ray, drugs and professional services are provided free by government health personnel, except when the patient decides to occupy a pay-ward bed in the hospital.

The primary health care approach has been operationalized in the delivery of TB services by emphasizing the domiciliary and ambulatory approach to treatment and by enlisting community participation in program activities.

The nature of community participation differs in the two sample RHUs. In RHU IV of San Miguel, Bulacan there is no *barangay* health workers to assist RHU staff, and TB symptomatics prepare their own sputum smears. This form of client participation, however, is considered inappropriate by central program authorities. According to them, proper techniques of collecting and preparing specimens — which even some rural health midwives and trained *barangay* workers are unable to perform well — should be followed.

In this RHU, staff also let patients take home the drugs needed for at least one week of treatment (including streptomycin vials), and ask them to find somebody to give them intramuscular injections. The rural health midwife explained that this is a recent phenomenon, because the RHU is extremely undermanned, and because the RHU staff who had earlier been collecting and preparing sputum specimens and giving intramuscular injections have themselves become TB symptomatic.

On the other hand, in the municipality of MacArthur, North Leyte, where there are about 50 active *barangay* health workers, community participation takes a more acceptable form. BHWs inform mothers with eligible children about BCG vaccination schedules, and visit TB patients to remind them to take their medicines regularly and to go to the RHU or *barangay* health station on specified dates to either renew their supply of drugs, receive intra-muscular injections, or get their sputum reexamined. *Barangay* workers are allowed to collect and prepare sputum specimens only after they have shown the RHU staff that they can perform such functions properly.

Barangay officials in MacArthur also encourage TB symptomatics to submit their sputum for examination, and they follow up patients who fail to go to the RHU or *barangay* station regularly. In addition, they organize *barangay* assemblies during which the RHU and *barangay* station staff inform community residents about available program services, and discuss how the residents could help control tuberculosis.

Private practitioners

The National Tuberculosis Prevalence Survey conducted by the National Institute of Tuberculosis from 1981 to 1983 revealed that TB symptomatics have grater confidence in private practitioners than in RHU and *barangay* health station staff (Valeza and others 1988:5-6). This may be due to the fact that private clinics generally provide faster and better quality service than government health centers.

The NTP does not discourage TB symptomatics from consulting private practitioners. The program is, however, very concerned about TB patients who discontinue private treatment due to financial difficulties because they are likely to develop resistance to anti-TB drugs. Hence, the program has recently instituted a system by which private practitioners can refer their low-income TB patients to nearby government health centers and integrated provincial health offices. This referral system can help improve the credibility of government health centers if they can match the private clinics' quality, despite the free service.

Program management

Supervision

In the past, because the Tuberculosis Section had no budget for travel, central personnel seldom undertook supervisory visits to field offices, and

were unable to personally observe and resolve implementation difficulties. A second problem was severe understaffing at the Central Office — it had only four medical staff and one clerk.

The upgrading of the Tuberculosis Section to a TB Control Service with a separate budget (including an allocation for travel), and the significant increase in personnel from five to 38 (including 13 medical staff, besides the chief), has improved the program's response-capability. The central staff now use a management style of going down to the grassroots level and leading by example.

All medical staff of the TB Control Service, including the chief, are required to devote seven to 10 days per month to supervision, not only of the regional health offices but also of lower operational levels (up to the *barangay* health stations), focusing on low performers. The medical staff also bring drugs and laboratory supplies to the regions they visit.

TB coordinators at the regional and provincial levels are similarly required to conduct supervisory visits to lower levels. However, the frequency and length of visits differ from region to region. In Region III, the lone TB and malaria coordinator devotes three to four days per week for supervision, but spends most of her time in Bulacan, in her role as multi-purpose regional coordinator. She visits other provinces only on an exceptional basis for dealing with problems encountered in implementing either the NTP or the malaria control program. Her heavy workload as regional coordinator precludes more frequent travel and responsive supervision, despite her good intentions.

In Region VIII, the two regional TB coordinators located in North Leyte travel to the other provinces only two to three times per month because of transportation difficulties and because the rural health office has set a P600 per month ceiling for travel allowance (including fare and per diem) per person. This amount covers only a few days' stay in the field.

In Bulacan, there is no ceiling for travel allowance. The provincial TB coordinators devote three days per week for supervisory visits to lower levels. In North Leyte, each provincial TB coordinator travels at least once a month to each of the three districts assigned to her. Each supervisory visit requires a prior written order from the provincial health officer so that transportation allowances can be claimed.

Communication

Between supervisory visits, central program personnel can communicate with the field using the single-side band radios installed at the central office (the Department Proper), at all integrated provincial health offices, and at some district health offices. In some areas, long distance telephone calls are also used, if available.

In Bulacan, all health district offices have single-side band radios; and the municipality of San Miguel also has a functioning telephone system which enables district health personnel to communicate after office hours with the municipal health officers who have telephones at home. However, the sample health district (Abuyog) in North Leyte has no single-side band radio; and there is no telephone link between the district health office and the RHUs.

Monthly staff meetings are held at each level. In addition, monthly catchment area conferences in each district assess implementation performance and help resolve problems. These conferences also serve a motivational purpose, but their effectiveness depends on how well they are conducted and how feedback to higher levels is received and used.

The case-study team was unable to personally observe any conference in San Miguel district; but was told that some RHU staff are reluctant to present their problems because in the past little corrective action has been taken by higher authorities. In Abuyog district, the conference observed by the case study team was attended by all RHU and *barangay* health station staff, the district coordinator, the provincial health officer, the assistant provincial health officer for public health, and other provincial health personnel. The provincial health officer scrutinized the implementation reports presented by the municipal health officers and the district coordinator, suggested corrective measures where needed, congratulated those who had done well, and elicited problems encountered by the RHU and *barangay* station staff, including difficulties in work relationships. Problems pertaining to the NTP were directed to the chief of the provincial health office's technical section and to the provincial nurse TB coordinator assigned to the district, both of whom are required to regularly attend the conference. Staff in North Leyte said that this is the way the conferences are held in all health districts.

Over the 20 years 1968-88, the program has produced three editions of NTP manuals: in 1969, 1980, and 1988. The latest edition includes procedures for the short-course chemotherapy. These manuals have certainly facilitated program implementation.

Monitoring and evaluation

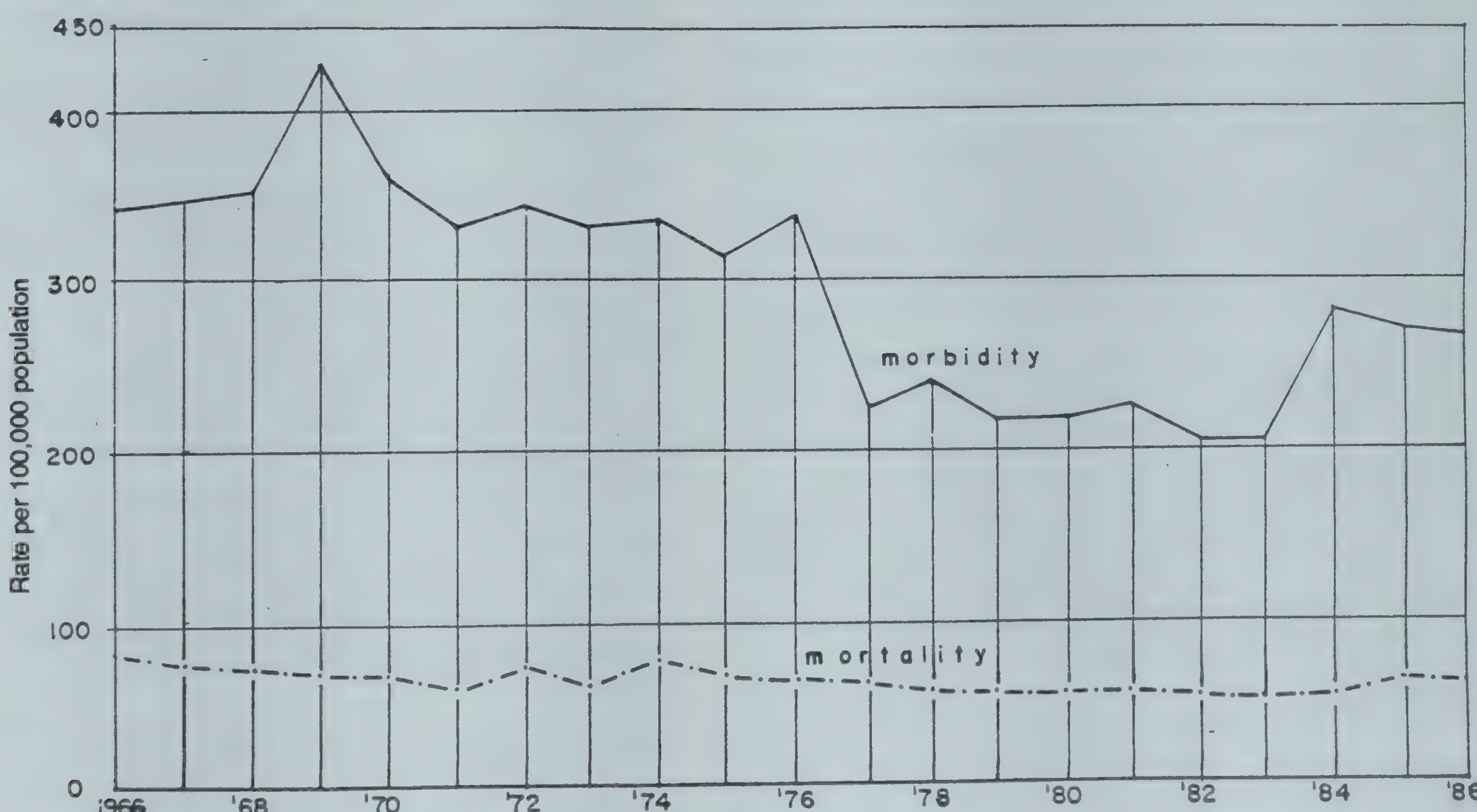
The program has developed a regular monitoring and evaluation system that does not depend on (the infrequent) supervisory visits to lower levels. In areas with active *barangay* health workers, reporting and recording starts at either the *purok* or *barangay* level, with the TB symptomatics and patients listed in a notebook by the workers. This listing facilitates follow-up for sputum examination, regular medication as per established schedules, reexamination of sputum, and other treatment activities at the health center, including intramuscular injections. It also helps in preparing and verifying the master list of symptomatics at the *barangay*-station level. When there are no active workerss, however, reporting and recording starts at the station level. The records and reports required at the various hierarchical levels are listed in Annex 2.

The implementing levels complain about the large amount of paperwork required for the NTP program, as for other health programs. At least 16 sets of reports have to be prepared by the *barangay* health station, RHU, and district health office levels annually; and this is one reason why the NTP reports are usually delayed. These levels also find the "cohort analysis" difficult, partly because this is a new report and partly because the term "cohort" is not understood by lower-level staff.

To overcome these problems, the implementing levels could be required to submit only quarterly and/or annual (instead of monthly) NTP reports; and they should be given on-the-job training on cohort analysis.

Performance evaluation is primarily based on the "percentage of target accomplished" and on other performance indicators reflected in the periodic NTP reports and in the operational plan for each level. Aggregate data on program performance at the national level are available in annual reports of the NTP, as noted earlier. Performance trends for the period 1966-86 are shown in Figure 6.2.

Figure 6.2 Morbidity and mortality from all forms of tuberculosis, 1966-86



Source: DOH Health Intelligence Service, *Philippine Health Statistics 1986*, p. 157.

Concluding remarks

The TB control program in the Philippines is facing the same set of constraints as the larger public health system: its evolution from a vertical organization to a decentralized program integrated with PHC has been the result of major reorganizations of the DOH; many of its program staff have other responsibilities as well, and are unable to provide the technical and administrative supervision needed; its logistical resources in the field — primarily equipment, vehicles, supplies, and operational funds — are inadequate; while formal procedures for planning, monitoring and control are in place, but the resources available are insufficient and program performance remains weak. However, in recent years, the government has taken steps to overcome some of these constraints and, hopefully, these actions will result in improved performance in the near future.

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Annex

1 National Tuberculosis Program structure and functions at various levels

CENTRAL LEVEL. The TB Control Service mainly performs the following staff functions:

- Formulates national policies, plans, and budget, and develops standards and techniques for the prevention and control of tuberculosis.
- Monitors and evaluates regional performance.
- Compiles national reports for higher authorities.
- Liaises with international agencies for material, technical, and other assistance to NTP.
- Trains and undertakes research, with the assistance of the National Institute of Tuberculosis (Manual of the National Tuberculosis Program 1988:7).

In addition, the TB Control Service specifies the technical and quality requirements for purchasing drugs and supplies through the Procurement and Logistics Service. It also allocates these drugs and supplies to different regions based on their annual targets.

REGIONAL LEVEL. The regional TB coordinator-designate has the following duties and responsibilities:

- Prepares NTP reports for the regional health director and higher authorities.
- Formulates the NTP regional plan, strategy, and budget for approval by the regional health director.
- Exercises technical supervision over provincial and city TB coordinators and government chest clinics.
- Arranges for and assists in the training of health personnel involved in the NTP.
- Monitors, evaluates, and coordinates the implementation of the NTP in all provinces and cities within the region.
- Consolidates NTP reports from the provinces and cities into quarterly and annual regional reports for submission to the TB Control Service.
- Allocates anti-TB drugs and laboratory supplies to all the provinces and cities within the region.
- Coordinates with other government agencies, private agencies and nongovernment organizations involved in the control of tuberculosis (Manual of the NTP 1988:7-9; field interviews and observations 1989).

PROVINCIAL AND CITY LEVELS. The provincial or city TB coordinator has the following duties and responsibilities:

• Plans, monitors, and evaluates the implementation of the NTP in the province or city.

• Coordinates and exercises technical supervision over the NTP activities of all health districts within the province or city.

• Maintains all the required NTP records, including a provincial or city case-index; prepares and submits monthly, quarterly and annual reports to the provincial health officer for transmittal to the rural health officer; and furnishes the TB Control Service copies of quarterly and annual NTP reports.

• Establishes a smear-checking system for the quality control of sputum examinations.

• Prepares requisitions for, and allocates anti-TB drugs and laboratory supplies to all health districts.

• Conducts on-the-job training in NTP of newly recruited personnel, recommends the holding of TB seminars from time to time, and initiates and assists in research and/or survey studies on NTP.

• Coordinates with nongovernmental organizations, private agencies, and other government agencies involved in the control of tuberculosis in the province or city (Manual of the NTP 1988:8; Field interviews and observations 1989).

DISTRICT LEVEL. The district health office has the following duties and responsibilities for the NTP:

• Supervises BCG vaccination of all newborns in the hospital before discharge.

• Supervises sputum examinations for TB symptomatics who consult in the out-patient department or come for admission in the hospital.

• Arranges for hospitalization of emergency and complicated TB cases as well as those with adverse and toxic reactions to anti-TB drugs.

• Ensures initial treatment and subsequently makes proper referrals to the respective area health center for continuation of treatment of TB patients confined in the hospital.

• Arranges for X-ray examination of TB symptomatics whose sputum examination is negative on two consecutive examinations.

• Supervises and coordinates all NTP activities of RHUs in the health district.

• Allocates anti-TB drugs and laboratory supplies to the RHUs.

• Reproduces and/or distributes monitoring forms to the RHUs.

• Collects all positive slides and 20 percent of the negative slides from the microscopy centers in the health district for validation at the District Hospital Laboratory.

• Prepares a master list of all new TB cases in the health district and consolidates the monthly NTP reports of all RHUs and the district hospital into monthly, quarterly and annual district NTP reports for submission to the integrated provincial office.

• Enlists cooperation and support for NTP of private practitioners, community leaders and other governmental and nongovernmental organizations (Manual of the NTP 1988:9-10; Field interviews and observations 1989).

MUNICIPAL LEVEL. The RHU has the following duties and responsibilities for the NTP:

• Gives BCG vaccination to all infants, preschoolers, and school entrants in the municipality except those who have been immunized in hospitals and private clinics.

• Collects sputum from TB symptomatics residing within the catchment barangays of the RHU and prepares the corresponding sputum smears.

• Stains and examines by microscopy the sputum smears prepared by the RHU staff and those forwarded by the rural health midwives manning the RHU's satellite *barangay* health stations.

• Treats and follows-up TB patients residing within the RHU's catchment *barangays*, including those that were partly/initially treated but subsequently referred by hospitals, private physicians and other RHUs.

• Allocates anti-TB drugs, sputum cups and slides to its satellite *barangay* health stations.

• Refers for X-ray examination to the district hospital TB symptomatics whose sputum examination is negative on two consecutive examinations.

• Attends to all patients with adverse reactions to anti-TB drugs or refers them to the district hospital if confinement is necessary.

• Exercises supervision over the NTP activities of the *barangay* health station and provides additional workers for NTP activities that cannot be performed by the rural health midwife and the volunteer *barangay* health worker.

• Encourages community participation in the NTP and conducts health information campaigns on the control of TB in all the *barangays* of the municipality.

• Maintains the NTP records such as treatment cards and master list of TB cases, among others,

and prepares the monthly and annual NTP reports as well as NTP operational plan of the RHU for submission to the district health office (Manual of the NTP 1988:10; field interviews and observations 1989).

Rurual health midwife level. The rural health midwife manning the *barangay* health station has the following duties and responsibilities for the NTP:

- Gives BCG vaccination to infants, preschoolers, and school entrants within the *barangay* health station's catchment *barangays* under the supervision and with the help of the RHU staff.
- Collects sputum from TB symptomatics within the catchment *barangays* and prepares the sputum smears with the help of the *barangay* health worker(s), and forwards the smears to the RHU for microscopic examination.
- Refers for X-ray examination to the district hospital, through the RHU, TB symptomatics whose sputum examination is negative on two consecutive examinations.
- Treats and follows-up all TB patients residing within the catchment *barangays*, including those partly/initially treated but later referred by hospitals, private practitioners and other RHUs and *barangay* stations.
- Identifies patients with adverse reaction to anti-TB drugs and refers them to the municipal health officer or to the district hospital.
- Encourages community participation in the NTP and conducts health information campaigns on the control of TB in the catchment *barangays*.
- Maintains the NTP records for TB cases within the catchment *barangays*, and prepares the monthly report as well as the annual NTP Operational Plan of the station for submission to the RHU.

2 *Reports prepared at various levels*

The following reports are prepared for the NTP:

Central level.

- Retrospective cohort analysis.
- Annual NTP Reports.

The TB Control Service submits a copy of the Annual NTP Report to the Office for Public Health Services for integration into the DOH Annual Report.

Regional level.

- Retrospective cohort analysis.
- Quarterly and annual NTP reports, including reports from PTS branches.

The rural health office submits copies of the above-mentioned reports to the TB Control Service.

Provincial level

- Cross index card.
- Logbook or index book of TB coordinators.
- Retrospective cohort analysis.
- Monthly, quarterly, and annual NTP Reports.

The integrated provincial health office submits copies of reports c) and d) to the rural health office and TB Control Service except for the monthly NTP reports, which are submitted only to the rural office.

District level

- Smear check forms.
- Master list of sputum positive and cavitary cases.
- Retrospective cohort analysis.
- Monthly, quarterly, and annual NTP Reports.

The district health office furnishes the integrated provincial health office copies of all the above-mentioned records and reports, plus the duplicate copy of treatment cards/forms of patients whose treatment is already completed and/or terminated.

RHU level

- Daily work record "D."
- Clinical referral slip for TB symptomatics referred for X-ray examination to the district hospital or PTS chest centers and for patients transferring for continuation of treatment to other health centers.
- Master list of TB symptomatics, sputum positives, and cavitary cases.
- Microscopy logbook.
- Treatment cards/forms.
- Prospective and retrospective cohort analysis.
- Monthly NTP reports.

The RHU furnishes the district health office copies of the latter two reports and the treatment cards/forms of patients whose treatment has been completed and/or terminated. In North Leyte, however, RHUs are not required to prepare and submit to the district health office the retrospective cohort analysis. This precludes similar analysis

at the district level unless the district coordinator has the time and inclination to personally undertake the task using raw data from the individual treatment cards.

Barangay HEALTH STATION LEVEL

• Daily work record "D" or consultation register/book for all patients, including TB symptomatics who come to the health center for examination.

• Clinical referral slip for sputum smears referred for examination to the microscopy center (RHU) and for TB patients transferring for continuation of treatment to other health centers.

- Treatment cards/forms.
- Master list of TB symptomatics.
- Prospective cohort analysis.
- Monthly NTP reports.

The *barangay* health station furnishes the RHU copies of all the above-mentioned reports and records except for the daily work record "D".

7

Zimbabwe: Schistosomiasis control

Introduction

This case study of schistosomiasis control in Zimbabwe is part of a larger study of the organization and management of tropical disease control programs in selected developing countries. Details of this intercountry comparative study are given in the Preface.

The Zimbabwe case study is different in scope and emphasis from the others. While the other case studies cover ongoing national control programs (in Brazil, China, Egypt, and the Philippines), the Zimbabwe case deals primarily with a number of recent pilot projects that are expected to lead to a decentralized national control program in the near future. In examining the possibility of expanding from small projects to a full-scale national schistosomiasis control program, comparison is also made with the malaria control program that has been ongoing for many years in Zimbabwe.

The present case study is especially interesting for two reasons: (a) it examines the organizational and managerial requirements of scaling up — an issue not fully examined in the other case studies; and (b) it examines the challenges of a community-based PHC-oriented control strategy that relies on such components as water supply, sanitation, and health education supplemented by mollusciciding and chemotherapy. Such a strategy is likely to be of interest to many developing countries — especially in Africa, where Zimbabwe's experience with the PHC-based approach could have direct relevance for countries interested in a low (recurrent) cost strategy for controlling schistosomiasis.

National health policy and organization

Upon gaining independence in 1980, the Government of Zimbabwe, through the Ministry of Health (MOH), embarked upon a national health policy designed to correct historical inequities in provision of health services based on race and geography. A white paper titled, "Planning for Equity in Health" stipulated that the large rural population be given priority, based on the primary health care (PHC) approach which emphasizes appropriateness, accessibility, affordability and acceptability of care. The PHC approach requires that each community accept responsibility for its own health, and that the government provide leadership and support, at all levels, to a decentralized multi-sectoral national strategy aimed at providing health for all.

The government's "Health for All Action Plan" for the five-year period 1985-90 is intended to reorient the former curative, urban-biased, and

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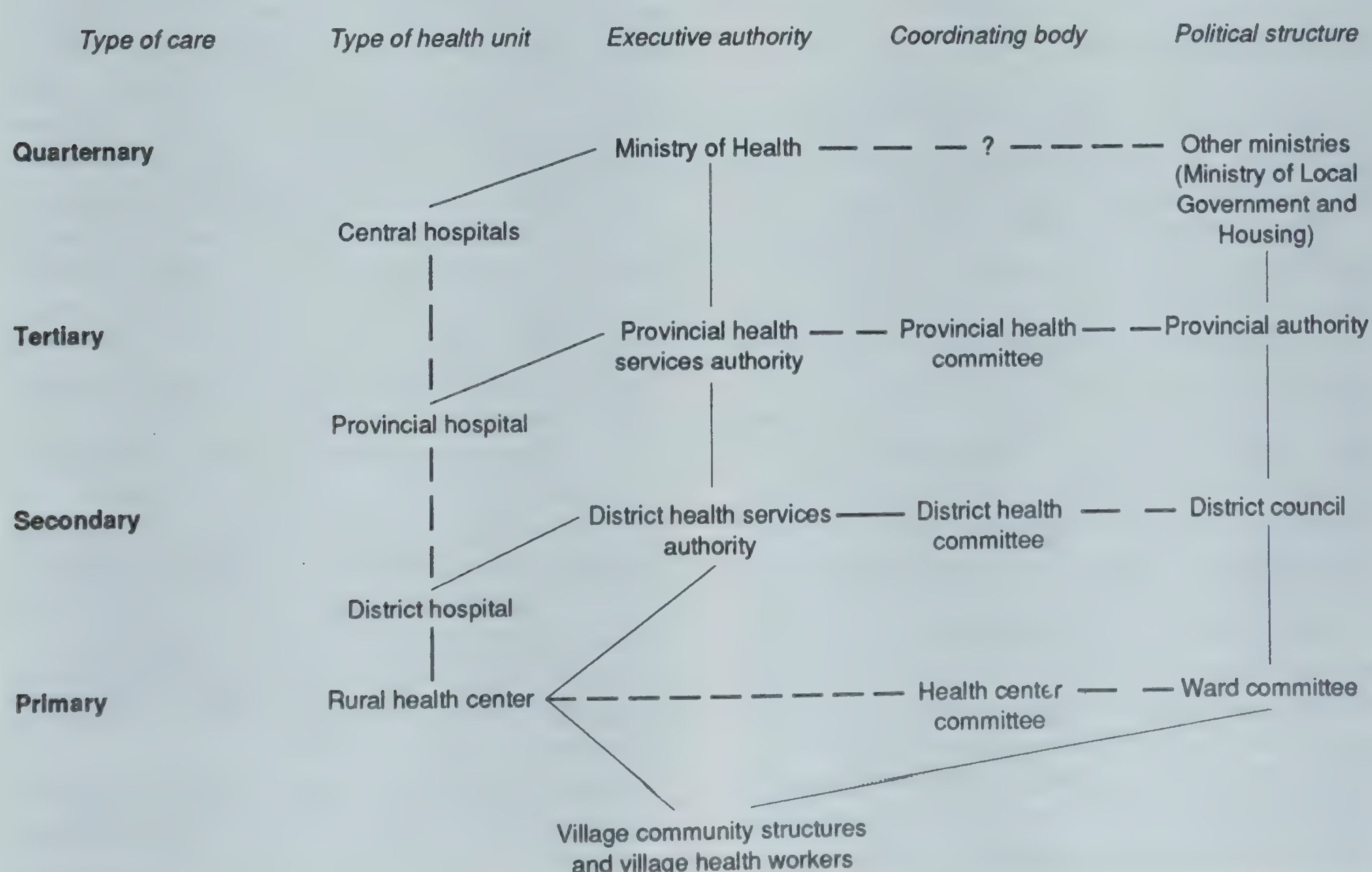
costly health services toward a comprehensive rural-based PHC system focused on promotive and preventive activities. The village health worker (now called the village community worker, or VCW) provides the vital link between the community and health professionals based at rural health centers that are to be established all over the country. Besides improving access to health care in remote areas, these local health services are expected to be integrated with other rural development programs, e.g. in education, water supply, sanitation, food production, etc., as part of an area-based socioeconomic development strategy.

A four-tiered government health organization is envisaged in principle, as shown in Figure 7.1 and discussed below. At the grassroots level are the VCWs; to date, 25,000 VCWs have been trained in villages throughout the country. Although these workers are linked to different government agencies (e.g. education, agriculture, community development, and health) at the village level, they are not considered extensions of the government service. For example, they are not specifically required to provide health care for the village. Instead, they are to be an expression of the villagers' collective commitment to promote health, and are to be selected by their own communities at mass meetings convened by the village and (political) branch committees. The role of the VCWs is expected to be primarily promotive, educative and preventive, for mobilizing the community and individuals to act on a wide range of health-related issues. It is proposed to train adequate numbers of VCWs (the training is for three-and-a-half months, including one month of field work) with the aim of ultimately having one VCW per 500 to 1,000 inhabitants.

Supplementing the VCWs at the grassroots level are the environmental health technicians. These government workers live in the local communities and are responsible for providing a variety of services, including health education; supervision and training in digging wells, installing water pumps and constructing toilets; and disease prevention (including control of schistosomiasis). Environmental health technicians receive preservice training for three years, including one year of practical training in a district.

The lowest (primary) level health care facility is the rural health center (RHC), with one or (ideally) two medical assistants. The RHCs are expected to provide basic but comprehensive promotive, pre-

Figure 7.1 The four levels of health services



ventive, curative, and rehabilitative primary care, concentrating on the following areas: maternal and child health, environmental sanitation, control of communicable diseases, health and nutrition education, and general curative care.

At the next (secondary) level, the District Health Services Authority is staffed by a district medical officer, a health services administrator, a nursing officer, an environmental health officer, and a pharmacist. Its main function in the government's decentralized health system is to support, supervise, and upgrade the PHC activities in the entire district, and to provide hospital care, mainly for patients referred from the RHCs. The district hospital normally has about 140 beds, and provides pediatric, obstetric, surgical, and medical care.

At the next (tertiary) level, the provincial health services authority is headed by the provincial medical director, has a management structure and functions similar to those at the district level, and covers the entire province (there are eight provinces, with 55 districts, in Zimbabwe). The provincial hospital provides medical and postgraduate training as well as in-patient care.

The next (highest; quaternary) level consists of the central and specialized referral hospitals, as well as the head office of the MOH responsible for establishing national health policies and guidelines. The management structure of the central MOH is shown in Figure 7.2.

The Blair Research Institute

The Blair Research Institute (BRI) in Harare and the smaller De Beers Research Laboratory in Chiredzi comprise the BRI, the only research institute directly under the MOH. Started in 1939 as the Malaria and Bilharzia Research Laboratory (in collaboration with the London School of Hygiene and Tropical Medicine), the Blair Institute's major responsibility is to conduct research into vector borne diseases and to advise on, and to some extent organize, control measures, especially for malaria. The Blair Institute is also responsible for the pilot projects for schistosomiasis control, discussed below. In addition, besides malaria and schistosomiasis activities, Blair staff give attention to water supply and sanitation, and to a number of other communicable diseases (such as plague, scabies, and viral infections). The organization chart of the Blair Institute is shown in Figure 7.3 (on page 110). Of its 130 staff members, about 50 are professional staff (15 researchers and 35 technicians) and about 80 are support and field staff.

The Blair Institute has the following functions:

• Undertake research into all aspects of the occurrence, control and prevention of vector-borne diseases.

• Provide advisory, supervisory, and evaluatory services to any individual or authority conducting schistosomiasis control activities.

• Help implement the national malaria control program (which involves spraying of houses with a residual insecticide (such as DDT and more recently deltametin on an annual cycle).

• Provide research and extension services for helping improve rural water supply and sanitation.

• Provide support for health education activities.

Historically, schistosomiasis control has been given a high profile by the Blair Institute. Large-scale molluscicides programs were launched in the 1950s, notably in the Mazuwe valley (30 kilometers north of Harare) and in other parts of the country (such as the Serima communal area) where the disease was highly endemic. Although at present there is no national control program for schistosomiasis, the Blair Institute is engaged in research on various aspects of the disease — its transmission, the effectiveness of various molluscicides (including a cheaper plant-based locally-produced product), and the effectiveness and suitability of various control strategies. It is expected that the (future) national schistosomiasis control program will be integrated with the primary health care approach, and will be implemented through the health care delivery system described above. The Blair Institute is therefore engaged in a number of pilot projects designed to assess the feasibility of the government's intended approach in the rural communal sector, in small-scale irrigation schemes, in large scale agricultural communities, and in large inland lakes where water contact is necessitated by commercial fishing and recreational activities.

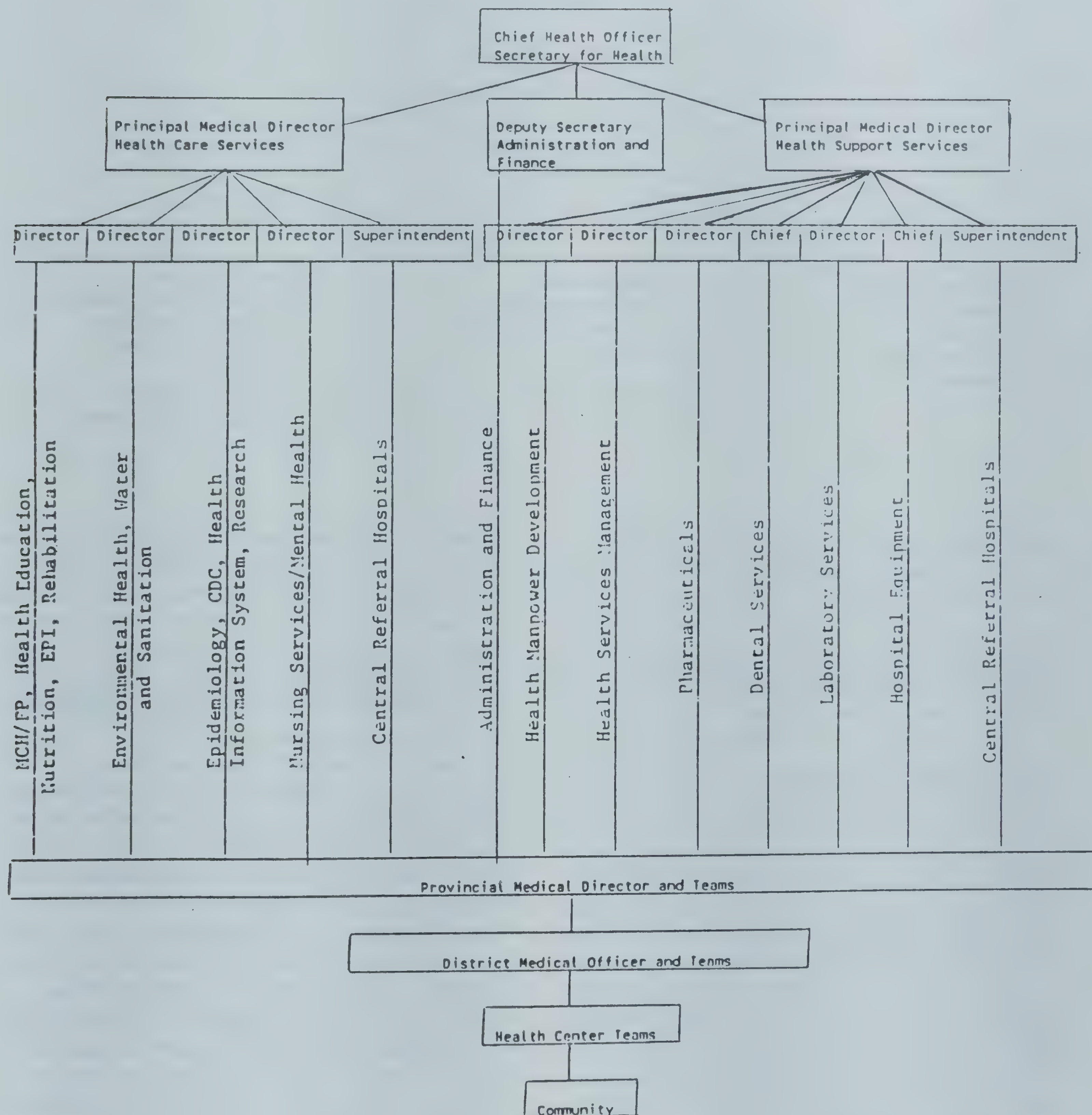
The research programs presently undertaken by the Blair Institute include the following:

• Comprehensive studies of the transmission dynamics of schistosomiasis (both human and snail transmission components) with special reference to spatial and temporal heterogeneity.

• Design and implementation of pilot projects to control schistosomiasis morbidity in irrigation schemes and communal areas.

• Drug and field trials with anthelmintics and plant molluscicides to determine efficacy and tolerance.

Figure 7.2 Current Ministry of Health structure



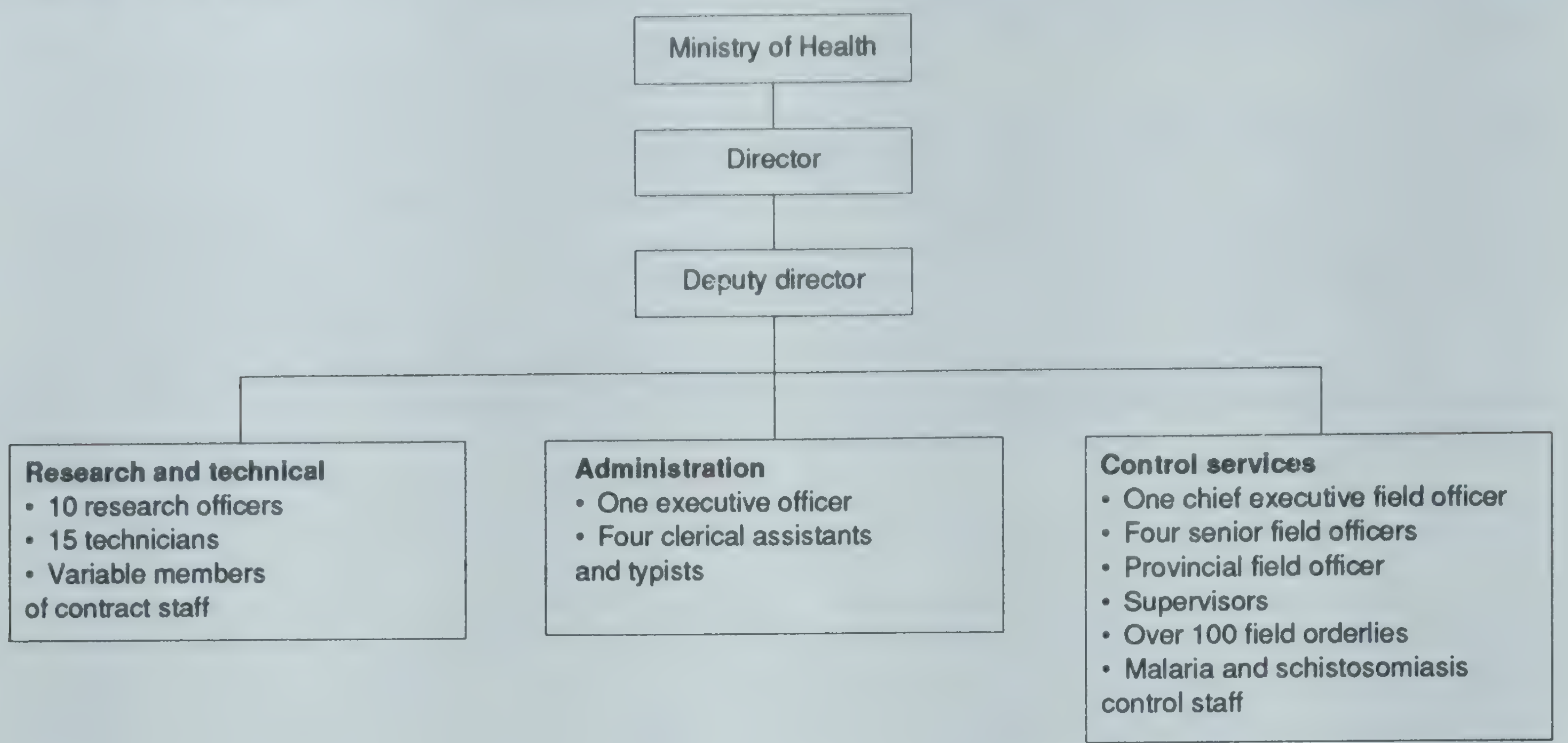
- National prevalence surveys for schistosomiasis and snail intermediate hosts as baseline data for future control programs.
- Continuous development and evaluation of the national malaria program, and its implementation through the decentralized health care system.
- Research on various aspects of malaria transmission and control (including insecticide resistance, serological techniques, etc.).
- Development of appropriate excreta disposal systems and water pumping technologies.

Ongoing control activities

Schistosomiasis in Zimbabwe

Both *S. haematobium* and *S. mansoni* exist in Zimbabwe. Based on the 1981-82 schistosomiasis survey of eight- to 10-year olds attending primary

Figure 7.3 Organizational structure of the Blair Research Institute



school, the country can be divided into three regions, with mean prevalence of *S. haematobium* among school children of 63.2, 37.1 and 14.3 percent respectively (see Figure 7.4 on page 111). Similarly, for *S. mansoni*, two regions can be identified, with mean prevalence in schools of 15.2 and 1.5 percent respectively (Figure 7.5 on page 112).

The northeast region has the highest prevalence of schistosomiasis, due mainly to the higher rainfall which results in even small streams being perennial. The southeast and midlands have moderate prevalence of schistosomiasis; while the lowest prevalence is found in the drier western regions of the country. However, generalizations are difficult, because transmission of the disease is very focal and greatly depends on the amount and type of water contact. Hence, even in areas of low prevalence there are isolated foci, usually associated with an irrigation scheme, a conservation scheme (dam), or a river, where there is a very high infection rate. Transmission is also very seasonal over most of Zimbabwe (with the exception of the Zambezi valley in the north and the southeastern lowveld where, due to warmer conditions and perennial water, seasonality is less marked).

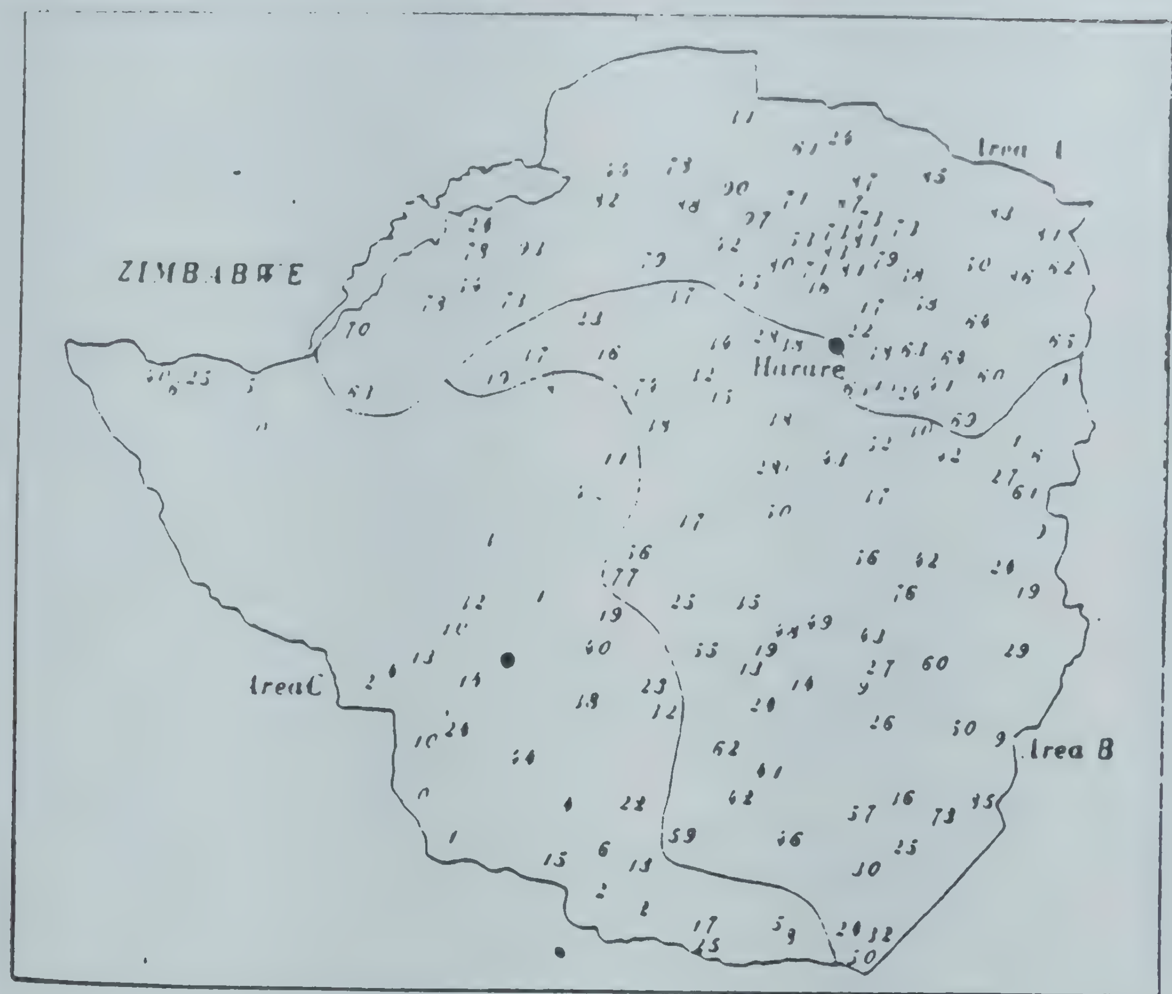
According to the 1981-82 survey, most commercial farming areas (which usually have good water resources) have higher levels of infection than the communal (subsistence) farming areas; and in all areas, female school children show a significantly lower prevalence of infection with *S. haematobium* than males. The age prevalence data, based on a supplementary survey in 1981-82 in four localities, shows that seven- to 20-year olds account for 91.5 percent of the heavy infections with *S. haematobium* and 83.7 percent of the heavy infections with *S. mansoni*. Eight- to 10-year old school children have the highest prevalence rates for both schistosomiasis species.

Based on these schistosomiasis surveys, it is clear that *S. haematobium* is a problem in most parts of Zimbabwe, particularly in the north and southeast regions of the country. *S. mansoni*, on the other hand, is a problem only in areas of focal transmission, and relatively few people have infection levels of clinical significance. The finding that children are the major infected and transmitting group implies that chemotherapy in schools can be an appropriate line of attack. Besides, *S. haematobium* can be treated with an easily available and cheap drug. However, due to the widespread, focal and seasonal prevalence of the disease in many areas, any long-term national strategy for controlling schistosomiasis would probably require considerable community involvement.

Schistosomiasis control in large irrigation schemes

Even though there is no national schistosomiasis control program in Zimbabwe, the important link between irrigation and increased incidence of schistosomiasis has long been recognized. As

Figure 7.4 Geographic distribution of *S. Haematobium* in Zimbabwe



Percentage of eight- to 10-year old children with *Schistosoma haematobium* at each school sampled. The prevalence figure is shown overlying the geographic location of each school. The country is divided into three zones A,B,C of different *S.Haematobium* endemicity.

Source: World Bank data.

noted by Bolton (1988), three factors have played a particularly significant part in this connection:

- The replacement of natural streams and pools, which are affected by seasonal floods and droughts, by permanent water bodies, has favored the establishment of large colonies of aquatic snails which are the essential intermediate hosts of the parasite.
- The high temperature, which occurs in the drier lowland areas of Zimbabwe where many of the large-scale irrigation schemes are located, has further stimulated snail colonization and disease transmission.
- The high densities of human settlement in and around irrigation schemes have created many locations where frequent human contact with potentially infected water can occur.

In view of these considerations, schistosomiasis control in large irrigation schemes has been practiced for over 30 years, based primarily on snail control using molluscicides (niclosomide). A major control effort has been concentrated on the Triangle and Hippo Valley Estates that lie at an altitude of 300 to 400 meters in the semi-arid lowveld region of southeast Zimbabwe (rainfall 550 millimeters per year) (Figure 7.6 on page 113). In these two estates, by 1977 irrigation of the 29,500 hectares (30 percent by sprinkler, 70 percent by flood) was producing virtually all of the country's sugar output. The water distribution system comprised over 300 small storage reservoirs, 600 kilometers of concrete canals and 1,500 kilometers of unlined drains and natural streams.

During the initial development of the irrigation scheme in the 1960s, the Blair Institute emphasized control of aquatic snails with molluscicides. The responsibility for control was later taken over by the estates' managers. A team of specialized "snail rangers" was trained to search for snails in the canals, reservoirs, and drains, and to apply molluscicides as required. Over a 10-year period, as the teams became more skilled and their methods of application improved, cost effectiveness of mollusciciding improved and the program achieved impressive results.

By 1972, the incidence of schistosomiasis among preschool children (i.e. the number of new infec-

Figure 7.5 Geographic distribution of *S. Mansoni* in Zimbabwe

Percentage of eight- to 10-year old children with *Schistosoma mansoni* at each school sampled. The prevalence figure is shown overlying the geographic location of each school. The country is divided into three zones D,E of different *S.mansoni* endemicity.

Source: World Bank data.

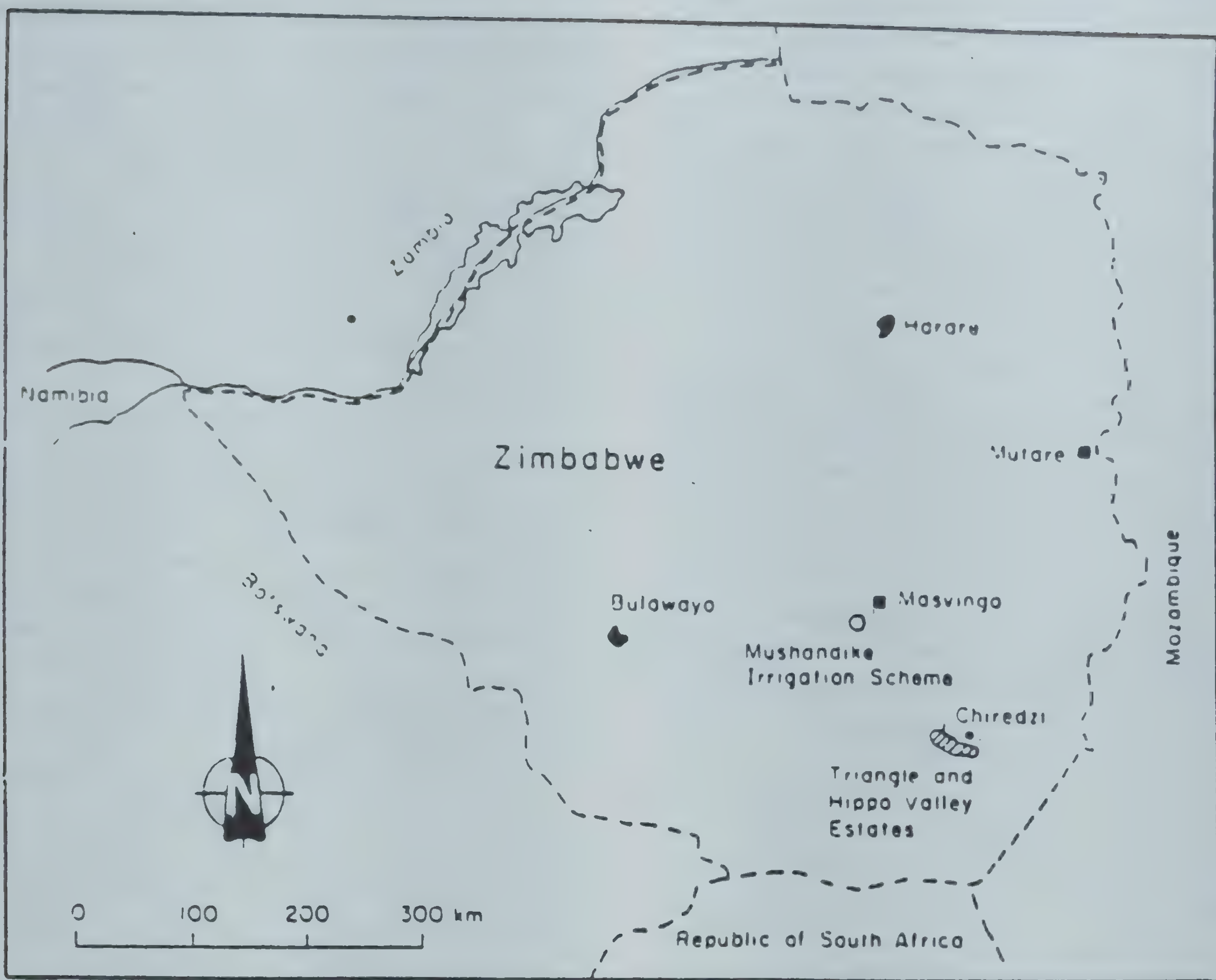
tions within a given period) had fallen by a factor of between three and five, compared with a similar irrigation scheme in another part of Zimbabwe where there was no control. By 1974, the incidence was virtually zero, although prevalence figures (i.e. the proportion of the population having the infection at a given time) had not fallen so dramatically (Evans, 1983). This was probably due to the fact that most workers and their dependents occasionally made visits to neighboring communal areas where transmission still occurred.

Despite the success of these control activities, the methods used in these estates have not been introduced in too many other irrigation schemes in Zimbabwe. The main reasons for this situation appear to be that the level of skill and organization required for effective control could only be provided in large-scale "commercial" irrigation schemes, and the cost of control (roughly US$ 1.00 per protected person per year, of which 60 percent was for molluscicide, 35 percent for salaries, and 5 percent for other costs including transportation) was too high for general replicability. These costs, especially for improved molluscicide application and for salaries of field technicians, have risen sharply in recent years, thus making the control strategy based on mollusciciding even more unaffordable on a nationwide basis. The recent trend has been to combine mollusciciding with other interventions that include selective chemotherapy of infected individuals, clearance of canals, and biological control of snails using locally bred molluscivorous ducks.

Pilot control projects

To test the technical suitability and administrative feasibility of alternative schistosomiasis control strategies, a number of pilot projects are presently being implemented in Zimbabwe. The three major projects are discussed briefly below. These cover a smallholder irrigation scheme (in

Figure 7.6 Project locations



Source: World Bank data.

Mushandike); a community-based multi-component project relying on safe water supply and sanitation (in Madziwa); and a smaller inter-sectoral pilot project at Lake Kariba.

Schistosomiasis control in a smallholder irrigation scheme

There are many smallholder irrigation schemes in Zimbabwe. One of the more prominent ones, the Mushandike scheme, covers a 600 hectare area, 20 kilometers southwest of Masvingo at an altitude of 875 meters (see Figure 7.6). The annual rainfall is 615 mm, the land has gradients of 1 to 2 percent, and the soils are poor and, in parts, stony. For almost 50 years, from 1930-80, the scheme was operated by a small number of European settlers using wild flooding; but as part of the new government's resettlement program, it is presently being redeveloped to take 400 smallholder families. This entails complete redevelopment of the in-field works, reservoir dams, and the canal system and off-takes by engineers of the Department of Agricultural, Technical and Extension Services (AGRITEX). This redevelopment is based on a careful design of the irrigation scheme, its operation schedule, and the siting of villages in a manner that increases the inhabitants' protection from schistosomiasis transmission.

The aim is to interrupt the transmission cycle by:

- Creating an aquatic environment that is not conducive to colonization by the vector snails.
- Reducing the contamination of water bodies with parasite eggs from human excreta and urine by providing sanitation.
- Discouraging the human population from entering potentially contaminated water bodies by providing adequate and safe water supplies. (Bolton 1988)

The first of these emphasizes the design and operation of the irrigation system, while the other

two emphasize appropriate infrastructure development and public health and hygiene. Since this strategy does not rely heavily on expensive molluscisciding and chemotherapy (unlike the large irrigation schemes), success of the Mushandike irrigation scheme could have direct relevance for many similar small-holder irrigation schemes in Zimbabwe. AGRITEX is responsible for 65 of these, covering a total area of over 4,000 hectares and supporting almost 6,000 farmers either wholly or partially.

Although different aspects of this scheme (e.g. sanitation, water supply, village development, and canal design) are the responsibility of different government agencies in Zimbabwe, an attempt is being made in Mushandike to coordinate the plans of various bodies. The general objective — to reduce schistosomiasis transmission and morbidity — is the same for each scheme, but the means used are especially tailored to the characteristics of individual smallholder irrigation schemes. The project is being regularly monitored, and will be formally evaluated in 1991.

Smallholder irrigation schemes such as Mushandike are managed by an AGRITEX manager in conjunction with a locally elected committee of farmers at the scheme. The manager ensures regular drying out of canals, water level fluctuations in storage reservoirs, routine canal maintenance such as removing stone or soil obstructions, weed clearance, and preventing water seepage to reduce snail populations in the schemes. To maximize uniformity in water usage, all farmers grow the same crops each season, which also facilitates schistosomiasis control through better water management.

Preliminary results are promising. Between April 1986 and August 1987, there has been a marked reduction in overall prevalence. For *S. haematobium*, the reduction in Mushandike was 53 percent, and for *S. mansoni*, 82 percent, in spite of continuing transmission in settlements upstream from the scheme. In the comparison area — a nearby irrigated farm where no control measures were introduced — *S. haematobium* prevalence declined by only 31 percent while that for *S. mansoni* increased by 22 percent. These results are supported by measurements of snail population sizes and their infection rates, and suggest that engineering and environmental control measures supplemented by chemotherapy can be significant low-cost means of controlling transmission in smallholder irrigation schemes. (Chandiwana and others 1988)

Community-based schistosomiasis control project

As noted earlier, the MOH adopted a PHC-based schistosomiasis control strategy in 1986, but a national program has not been implemented as yet. Instead, a pilot project was undertaken in 1986-89 by the Blair Research Institute to further develop the detailed mechanics of such a program. It was preceded by a two-year longitudinal study of the prevalence and transmission of schistosomiasis and of human water contact patterns in two communal areas in the highveld region in northeast Zimbabwe.

The four-year pilot project in Madziwa involved implementation of a comprehensive set of schistosomiasis control activities. It was funded in part (Z$400,000) by the International Development Research Center of Canada. Most of the money was used for field supervision (mileage and vehicle maintenance) and drug procurement. Preliminary results of the pilot project are now available, and a more extensive impact evaluation is planned for the future.

The main project objective was to develop and evaluate an integrated community-based schistosomiasis control program within the primary health care system. The study areas were the Madziwa and Bushu Communal Lands in the Chaminuka district of Mashonaland Central province. Madziwa comprises 21,000 hectares, has a savanna-grassland terrain, many streams, four perennial rivers, three dams, 49 villages, and over 32,000 people (1982 figures) whose livelihood depends on subsistence farming (see Figure 7.7). The Bushu area is 13,000 hectares, is similar in many respects to Madziwa, and has 8,000 people living in 16 villages. Bushu was used as a "comparison area" for the study. In both areas, the high rainfall and temperature in summer, the high population density, the use of natural waters, and a very low level of hygiene provide the conditions for intensive transmission and high incidence of schistosomiasis.

The pilot project had the following components, to be largely implemented through community participation:

• *Sanitation.* The community in Madziwa area had agreed to a target of one ventilated (Blair) latrine per family, i.e. a total of 3,000 single-compartment latrines to be built. Each family was expected to dig the pit for the latrine, provide the bricks, and either build the latrine themselves or pay for a builder from the community. Total cost of the latrine was estimated at about Z$50, com-

Figure 7.7 Madziwa communal land

A. Population distribution and ward boundaries.
B. Permanent waterbodies, ward numbers and boundaries.
C. Primary schools (•), secondary schools (▲), clinics (+), and roads.
D. Water-supply points: bush pumps (•), Blair Pumps (O) and monopumps (▲).

pared with about Z$10 for building a hut using self-help. The MOH, using donor funds, provided a subsidy of about Z$28 per latrine for cement (which is expensive in rural areas), flyscreen, and reinforcing wire. It also provided technical advice through the village community workers (VCWs), the local environmental health technician, and the Blair Institute staff assigned to the project.

• *Water supply.* Initially, the community was largely dependent on unprotected water sources. The scattered nature of rural settlements in communal areas made it unlikely that safe water points could be provided for all households. Hence, the project aimed at providing one protected water point for every 25 to 30 families. The community was to be responsible for digging the well and for maintaining the Blair pump (each costing about Z$200) provided by the MOH.

• *Health education.* The community's lack of knowledge of schistosomiasis and its relationship with hygiene, safe water, and sanitation was to be addressed by local health authorities and VCWs through discussion, example, talks, films, and drama. Simple posters on schistosomiasis, and pamphlets on construction and maintenance of latrines and water supplies, were planned to be used.

• *Snail control.* This was not being practiced by the community due to the expense and expertise involved in application of commercial molluscicides. In the pilot project, a single application of a synthetic molluscicide (niclosomide) was considered adequate for major contact points to supplement the initial chemotherapy.

• *Chemotherapy.* This was the only direct health service provided by the project staff, and was directed at school children, the most heavily infected group. Treatment with praziquantel was to be carried out every six or 12 months in schools, with diagnosis undertaken by trained microscopists on the basis of urinalysis. This component was also to be implemented in the Bushu comparison area.

The Madziwa schistosomiasis control project was organized and managed by the Blair Research Institute with logistical support from the provincial medical directorate of Mashonaland Central where the project is situated. Full-time research technicians and field activities were under the director of the BRI. This organizational arrangement allowed optimum technical input and enabled most targets to be achieved.

All project activities were undertaken as planned. They were systematically monitored to assess their effectiveness and potential applicability in a national schistosomiasis control program. The following measures were used:

• A knowledge, attitude, and practices survey at the beginning and end of the project measured the impact of the education program and changes in human behavior (especially the behavior of those who had built latrines).

• Annual age prevalence surveys to measure the project's impact.

• Parasitology for *S haematobium* and *S. mansoni* on 20 percent of the sample of school children during treatments, to assess the impact of treatment on prevalence and intensity of the disease.

• Twice yearly snail surveys to monitor the infection rates in the vector population.

• Monitoring of sanitation and water interventions, using progress reports and surveys of completed structures (to assess usage and maintenance).

• Comparison of data for the Madziwa area (receiving all interventions) and the Bushu area (with only the chemotherapy intervention).

In terms of overall achievement, treatment with praziquantel had a marked effect on prevalence, as shown by reexamination of school children and by the age prevalence surveys. However, reinfection was rapid, especially among seven- to nine-year olds who also had the greatest recurrence of heavy infections. The sanitation program was quite successful, with 2,152 (mostly double-compartment) latrines completed, using self-help by the beneficiary families (the target was 3,000 single-compartment latrines). Despite some problems and defects in construction, the latrines were of acceptable standard and are being used by a majority of household members.

The water program was slow to start and had many problems, but by project completion, 104 of the targeted 150 hand pumps (three per village) had been protected (not all were new installations). Satisfactory operation and maintenance of the pumps remains an issue at the project as well as national level. The construction of washing slabs at most bore holes had an important positive impact on water contact behavior. However, based on the knowledge, attitude, and practice surveys, it appears that the health education program had a lesser impact, although the school dramas did help.

Some aspects of the pilot project were particularly supervision-intensive, and merit further elaboration. Of these, the most important was the

generation of community participation in project implementation, particularly for water supply and sanitation. The technological requirements of digging wells and installing pumps were fairly straight-forward (and conformed with the recommendations of the National Master Plan for Rural Water Supply and Sanitation, produced by NORAD for the Ministry of Energy, Water Resources and Development). However, the task of mobilizing the community to provide labor, bricks, and sand required much effort and supervision by project staff from the MOH/Blair Research Institute.

Furthermore, the task of mobilizing the community to assist in the building of washing slabs was assigned in 1987 to the District Development Fund (under the Ministry of Local Government, Rural and Urban Development). The fund was also required to assist in the formation of water sub-committees for the maintenance and repair of Blair pumps and the bush pumps in the Madziwa area; and subcommittee members were trained in the installation, care, and maintenance of water facilities. Although these activities were successfully completed, maintenance remained a problem because no "pump-menders" had been employed in Madziwa, and the village water committees had no technical support.

Operational problems were faced in the sanitation component as well. Significant delays were caused by the limited local capacity for building latrines (due to a shortage of trained builders and insufficient subsidy of cement); the problems of supplying construction materials to groups of households; and the difficulties of effectively supervising the large number of widely dispersed building operations.

The health education component also depended on community involvement, particularly for organizing drama competitions in primary and secondary schools. (The themes of the dramas were the relationship between unprotected water sources and schistosomiasis, the adoption of good sanitary practices, and the mode of transmission of schistosomiasis.) High ranking officials from the Ministries of Health and Education judged these plays and gave the prizes. This — and other aspects of the health education component as well — required close collaboration between the provincial medical director, Blair Institute staff, health assistants, village community workers, schools, and the community; and proved to be complex and time consuming, though beneficial.

For obtaining the required community participation in the project, the most effective channels were the ward and village committees and the village community workers. The district council's support for the project was good, but the councilors were largely ineffective in transmitting this support back to the community. Households with higher economic status and with larger family size were better able to take advantage of the "self-help" resources, and had a larger incentive (partly need, partly prestige) to participate in the sanitation component of the project. The water-supply component, however, met a universally felt need, and succeeded in influencing water contact behavior. Except for washing clothes (which requires large volumes of water), most users have left their original sources of unprotected water in favor of the Blair and bush pumps provided by the project.

In terms of overall results, in comparison with the earlier snail surveys which provided good baseline data on seasonal patterns of population size and transmission, there is as yet no clear statistical evidence of a reduction in transmission following the treatment program. Furthermore, comparison between the Madziwa and Bushu areas to assess the effects of the water and sanitation program does not yet reveal any measurable difference in transmission rates. A more detailed impact analysis is planned for the next few years to assess the possibly lagged effect of these two prevention-oriented components.

However, the rapid reinfection rates following treatment suggest that chemotherapy and mollusciciding would have to be repeated at an economically unacceptable frequency — thus supporting the MOH view that water and sanitation measures are probably more appropriate and sustainable in the long run than activities dependent on imported drugs or pesticides alone.

Pilot project at Lake Kariba

This project involves control of schistosomiasis at Lake Kariba through the involvement of the local community (the Kariba Town Council and commercial fishermen or "plot holders"). The community pays for and procures the chemical molluscicide (bayluscide) and organizes weed clearance to control snail populations on the lake shoreline. In addition, fishermen and their work force are educated on the risk of contracting infection, and unnecessary contact with water is discouraged by construction of fences along the shoreline. The Blair Institute coordinates the project and conducts annual prevalence surveys for schis-

tosomiasis in the local population to identify those requiring treatment. This exercise, together with surveys for snail populations in the shoreline, provides an objective basis for assessing the effectiveness of control interventions.

Scaling up to a national program

National schistosomiasis control strategy

As noted earlier, the Government of Zimbabwe has rightly decided to emphasize low-cost strategies that can be implemented widely, using the available administrative, human, and financial resources. To ensure sustainability over the long term, in 1985-86 the MOH adopted a PHC-based strategy for schistosomiasis control. Broad objectives have been set and detailed targets specified for morbidity reduction over the five years 1985-90. A multicomponent strategy, using snail control, safe water supplies, adequate sanitation, health education, and chemotherapy is to be used, with all components except chemotherapy embodied in the PHC program. Since lack of sanitation, enforced contact with unprotected water sources, and lack of community understanding about the transmission dynamics of schistosomiasis are the basic reasons for continued disease prevalence, it has been decided that no mass chemotherapy program should be implemented in any region unless improvements have been made in water supply and sanitation. (In these two areas, Zimbabwe has an active national program as part of its general development strategy).

Since environmental sanitation clearly plays a major role in the prevention of water-borne diseases, two significant but inexpensive innovations — the simple water-pump and the ventilated privy-latrine — developed by the Blair Institute and successfully tested and evaluated over the last 10 years, are expected to provide the primary means for long-term prevention and control of schistosomiasis. Targets have been set for the annual provision of 7,000 protected water supply points countrywide, and for the construction and use of 70,000 Blair latrines each year for the next 20 years. In addition, health education officers have been deployed at all levels of the health care system. The development and dissemination of suitable training and information materials is considered an essential component of the national Health for All Action Plan (covering the period 1985-90).

As per this plan, by 1989 the national schistosomiasis control program should have been implemented in 50 percent of the areas with the highest prevalence of infection. Implementation was expected to involve community participation in education, water supply, and sanitation, as well as direct health service provision of chemotherapy in schools. The program targets for 1989 were: (a) reduce prevalence of morbidity in children due to *S. haematobium* to 5 percent in the areas covered by the program; and (b) less than 1 percent of school children covered by the program should have an intensity of infection of *S. haematobium* in excess of 50 eggs per 10 milliliter of urine.

As per the national strategy, schistosomiasis specialists at the central level are expected to be fully involved in implementing the PHC-based control program. These specialists — primarily at the Blair Research Institute — are considered essential for sound planning, implementation and monitoring of the program. Hence, with respect to organization and management, the plan is to share program responsibility among four "levels": (a) the village community worker; (b) the health service periphery (the health center); (c) the district and provincial health authorities; and (d) the central specialists.

In view of the high cost of drugs and the already large scope of responsibilities assigned to the VCWs, direct responsibility for chemotherapy and for collection, analysis and consolidation of field reports is not to be given to these village-level workers. The VCWs are to be responsible for stimulating remedial action by the community for overcoming deficiencies in sanitation, hygiene, water supply, and water contact behavior. The health center staff are expected to be the first "reporting" level.

The health centers' monthly reports to the respective district health authority are expected to be consolidated by the latter and submitted to the provincial health authority. The latter are thus expected to have adequate data on health status by area, even though, in the short term, this is not expected by itself to provoke direct action involving chemotherapy. The expectation is that chemotherapy would be undertaken on a fairly rigid schedule determined by the Blair Institute personnel.

Blair's specialist team is given responsibility, at the central and provincial levels, for all externally-funded inputs to the schistosomiasis control program, including the donor-supported water supply and sanitation activities and (particularly) all

interventions involving imported (expensive) drugs. Based on periodic field visits and surveys, this central group at the Blair Research Institute is also expected to compile and assess information on program implementation, using such data as: the number of latrines built; the number of water points protected; the utilization of these facilities in various regions; the proportion of population treated for schistosomiasis in each area; and the aggregate pattern of morbidity due to schistosomiasis in each endemic area and for the country as a whole.

Organization and management considerations

At first glance, the MOH's strategy for national schistosomiasis control appears to be endorsed by the results of the pilot projects — especially the water- and sanitation-oriented project in Mushandike and the community-based project in Madziwa. However, several organization and management issues are presently being discussed by staff of the MOH and the Blair Research Institute in order to arrive at firm recommendations for scaling-up from pilot project to a national PHC-based control program.

The following aspects are being considered:

- The technological package suitable for the national program.
- The administrative intensity of the proposed strategy.
- The nature and extent of likely community participation.
- The likely support from the national water supply and sanitation program.
- The mechanisms for effective integration with PHC activities.
- The cost-effectiveness of the pilot project(s), and financial implications of their expansion to a national program.

In terms of objectives, it is generally agreed that the national schistosomiasis control program should aim at morbidity — rather than transmission — control. There is also agreement that the national program should be based on a mix of technological interventions, i.e. chemotherapy, mollusciciding, water supply, sanitation, health education, and environmental modification. The main technical issue is what relative emphasis should be given to the different control technologies, based on their technical efficacy, administrative feasibility, financial requirements, and long-term sustainability.

As noted earlier, the efficacy of chemotherapy in reducing the worm-burden, and hence the intensity of infection and morbidity, is now well established in the literature as well as in the Madziwa project. The participation of school children — the most heavily infected group — is relatively easy to obtain. The technical efficacy of mollusciciding has also been established in Zimbabwe through the large scale irrigation schemes.

However, due to the problem of rampant reinfection, repeat treatments with drugs and molluscicides are needed at frequent intervals. Also, both these interventions require scarce foreign exchange and, under present circumstances in Zimbabwe, appear to be unaffordable and unsustainable for a national program. Therefore, given the trade-off between cost and efficacy, the alternative of using focal mollusciciding and selective chemotherapy is perhaps an understandable compromise reached by the MOH — especially if these approaches are supplemented, as intended, by reasonably effective low-cost measures that might be feasible nationwide.

In principle, water supply, sanitation, and health education seem to fit the latter requirement. Besides, the Government of Zimbabwe is already implementing a nation-wide water and sanitation program, funded in part by external donors. Hence, it seems reasonable to try and piggyback the schistosomiasis control program on an ongoing government scheme, as the MOH intends to do under its national schistosomiasis control strategy.

The Madziwa project was intended to test precisely this approach. It emphasized water supply (wells, pumps, and washing slabs) and sanitation (latrines), built with community self-help to reduce costs of installation. These components were implemented fairly satisfactorily, though operational delays were experienced and maintenance remains a problem. The health education component fared less well, but yielded valuable experience for the future. The project's preliminary results show that the MOH's national program strategy is potentially feasible.

Yet, some uncertainties remain. The construction of wells, pumps, washing slabs, and latrines was heavily subsidized by MOH (and by a donor, IDRC), and it remains unclear if these subsidies will be affordable under a national program. (The donor funding for Madziwa was roughly Z$10 per capita; Zimbabwe's rural population is now about 7 to 8 million.) Also, much technical and administrative support by project staff was needed, as was constant supervision, monitoring, and fol-

low-up. Blair Institute staff were able to directly provide this support and supervision, but it remains unclear if such assistance would be possible in a national program implemented entirely through the decentralized health care delivery system over which the Blair Institute staff have limited administrative influence.

In this sense, the Madziwa project perhaps could not have adequately simulated the administrative conditions under which the full PHC-based national program would have to be implemented; and extrapolation from project experience to implementation at the national level remains a matter of informed judgement. The question of whether the administrative intensity of the pilot project(s) would be replicable in the national program therefore still remains to be addressed.

For doing this, an assessment of the strengths and weaknesses of the public health delivery system at the district and village levels is needed. In addition, experience of the national water and sanitation program being implemented through the Ministry of Energy, Water Resources and Development, is relevant. The latter program relies on community participation supplemented by government support (technical, administrative, and financial) — as would the proposed national schistosomiasis control program — and hence a realistic assessment of its present and potential achievements would be useful.

Based on this assessment, judgements can be made on how much the schistosomiasis program could rely on the ongoing national water and sanitation program, and how much additional support would be needed from the MOH. If a further judgement is made that the present PHC-based delivery system is capable of providing the much needed administrative, financial, and technical support in a cost-effective manner, much of the present uncertainty regarding the scaling-up from pilot projects to a national schistosomiasis control program could be resolved.

Although there has not been a formal assessment of the decentralized PHC system in Zimbabwe — either in the water and sanitation program or in other areas — at provincial and district levels there is the feeling that decentralization has been in name only and major decisions are still made at the central level. This may be true of some aspects of the organization, but most health related interventions are implemented at the provincial and district levels. Phase II of the Madziwa project will hopefully revisit its organization and management aspects.

Comparison with the national malaria control program

A preliminary assessment of the likely constraints and feasibility of scaling-up can be based, in part, on the experience of other disease control programs in Zimbabwe. In particular, the experience of the ongoing national malaria control program could be relevant. This program is being jointly implemented by the Blair Research Institute and the MOH's decentralized health delivery system. The program has been in operation for about two decades and presently utilizes the same administrative channels as those proposed for the national schistosomiasis control program.

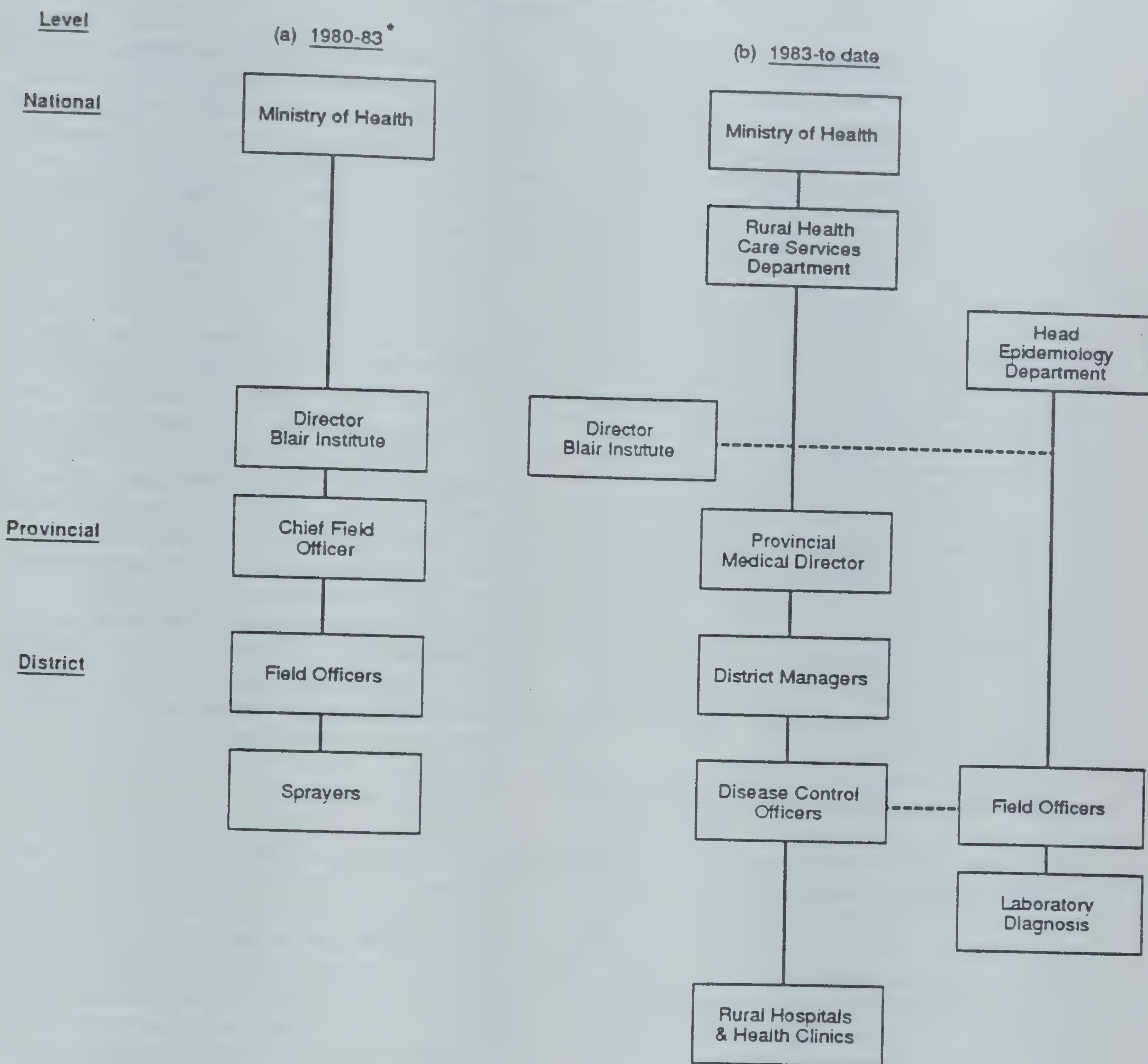
Malaria is a major cause of morbidity and mortality in rural Zimbabwe, with about 5 million people exposed to the disease each season. It is among the main reasons (in percentage terms) for hospital and clinic attendances in endemic areas during the peak transmission season. Although incidence depends on altitude, rainfall and season, many agriculturally rich areas are susceptible to malaria, with potentially disastrous human and economic consequences.

Prior to independence in 1980, malaria control activities were limited in scope, and the focus was on spraying of houses with DDT in areas of unstable malaria in order to suppress epidemics. From 1980-83, a full-fledged national program was administered entirely by the Blair Research Institute; and since 1983, as part of the overall restructuring and decentralization of the health services, malaria control is now an integral part of the provincial medical directorate and the district health administration. The organization and staffing of the national malaria control program before and after the 1983 restructuring are shown in Figure 7.8.

From 1980 to 1983, all malaria control personnel (including the 650 spraymen) were directly employed and supervised by the Blair Research Institute. Full-time field officers, supervisors, and technicians of the Blair Institute provided field-level direction and supervision, while other Blair personnel undertook research and provided diagnostic services. This categorical (vertical) organization was apparently quite effective in implementing the national program, primarily because it had full control over its field activities and resources (DDT, vehicles, mileage, maintenance, and spraymen).

Under the present decentralized system, MOH staff at provincial and district levels are respon-

Figure 7.8 The national malaria control program, 1980 to date



*All malaria staff were Blair Research Institute employees

sible (along with their other duties) for malaria control. Each provincial medical director has a separate malaria control unit, although budget allocation, especially for procuring the imported DDT, remains centralized. Actual control operations are carried out by spraymen hired on a seasonal (temporary) basis by district-level disease control officers who are also responsible for program administration, health education, and equipment purchase and maintenance.

These officers and spraymen are supported at the village level by staff of the rural hospitals and health clinics who are responsible for collecting blood slides and sending them to the central diagnostic facilities of the Blair research laboratory in Harare. The epidemiology department of the MOH head office is responsible for keeping track of malaria prevalence and incidence, nationwide, based on the results of surveys and submissions by district hospitals and clinics and diagnostic

tests undertaken by Blair staff. (A national survey was carried out in 1983 and mapped the country's malaria zones.)

Although much progress has been made over the years in malaria control, many problems remain. First, slide submissions to the central Blair laboratory do not provide an accurate reflection of disease distribution in the country because health center staff are hard pressed for time, and do not take blood slides of all patients diagnosed to have clinical malaria. In addition, misdiagnosis at the clinic level is very common (meaning that their diagnosis is not confirmed by laboratory tests); and a large proportion of the prescribed drugs are probably being wasted.

Second, disease surveillance is not systematic or reliable enough to detect potential epidemics — because diagnostic facilities are poorly equipped and too centralized, and there are not enough microscopes in field locations. In some instances it has been difficult to predict and prevent serious loss of life among non-immune children. A better system for conducting regular and accurate surveillance surveys is needed, not only to track disease distribution but also to provide reliable field-data on the efficacy of various antimalarial drugs (an essential aspect of the research being done by the Blair laboratory).

Third, the human resources available for planning, implementation, monitoring and evaluation are rather limited. Only one entomologist is presently employed in the entire national program; none of the field program managers is adequately trained for malaria control work; there are only eight competent diagnostic microscopists; and there is a severe shortage of trained, experienced, dedicated, and adequately remunerated spraymen to do the basic spraying. Equipment shortages are also endemic, and the current fleet of vehicles is virtually obsolete. Frequent vehicle breakdowns are common, often leading to a virtual halt of control operations.

Furthermore, since the Blair Institute does not have sufficient vehicles for deploying entomologists and parasitologists in the field during the malaria season, few insecticide resistance tests have been conducted for the past three years — and hence the efficacy of the 250 tons of DDT applied annually during this period remains largely unknown. The study of drug (chloroquine) resistance is similarly constrained. Equipment for storage and processing of parasites is also lacking or is in a state of disrepair, thus militating against quality research in support of the control program.

All these constraints — lack of reliable surveillance; limited funds (especially foreign exchange), transport, equipment and manpower; limited planning, supervision, and follow-up; and the increasing problem of insecticide and drug resistance — need to be tackled urgently if the decentralized PHC-based health system is to be effectively used for improving the quality and coverage of the national malaria control program.

Most of the constraints noted above are not unique to the malaria control program. They apply equally to the other disease control activities of the MOH and the Blair Research Institute. To overcome these constraints, Blair staff have prepared proposals for MOH and donor support, so that the essential activities of surveillance, prevention and control can be adequately performed in the future. In addition, discussions are ongoing with provincial and district-level staff of the MOH to ensure that they give adequate attention to implementing and supervising control activities, including those that require community involvement (such as health education, water supply and sanitation). It is expected that these activities will be strengthened as the MOH's PHC strategy and system are further developed.

Concluding remarks

Schistosomiasis control activities in Zimbabwe are at a stage where major decisions regarding scaling up from pilot project to national program are likely in the near future. The MOH's PHC-based schistosomiasis control strategy could work if adequate attention is given to technical, organizational, and managerial requirements of schistosomiasis control. As in the case of malaria control, constraints have to be overcome at the national, provincial, district and village levels.

In order to ensure an effective and efficient national schistosomiasis control program based on water supply, sanitation, and health education, supplemented by chemotherapy and mollusciciding, a larger planning and supervision role might have to be assigned to the specialized staff of the Blair Research Institute until the proposed disease control unit is fully established (see below). In addition, there is need for closer inter-sectoral cooperation between various government departments, agencies and levels — as well as closer integration between the schistosomiasis control

program and the ongoing PHC activities — than was required under the pilot projects undertaken thus far.

Community involvement on a self-help basis will also be more difficult to generate and sustain on a country-wide basis, especially since the existing funding, manpower, and physical resource constraints are likely to continue for the foreseeable future. While some of these issues can only be resolved through a gradual process of learning-by-doing, these factors merit serious consideration in planning and implementing the proposed national schistosomiasis control program.

It is therefore commendable that the MOH is presently considering a major revival and restructuring of disease control programs, based on a comprehensive assessment of the experience of pilot and ongoing programs in Zimbabwe and elsewhere. A separate disease control unit in MOH headquarters, with planning, surveillance, coordination, and oversight responsibilities for all tropical diseases (including malaria and schistosomiasis), is being considered. This unit would provide a much needed central focal point and priority for an important health service requirement—which might otherwise get lower priority in the decentralized primary health care system. The program implementation responsibility would still remain with the provincial medical directors, their disease control units (the expanded malaria control units), and the district and health center staff. The existing environmental health technicians would continue to monitor various disease control programs at the village level, thus creating a partially-categorical program organization within the existing "integrated PHC" system. This proposal merits serious consideration by Government and donors interested in revitalizing Zimbabwe's disease control programs.

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